CCD Solid State Camera
LDH 0600/00
LDH 0600/50

Service manual

4822 733 24279

I&E

Industrial & Electro-acoustic Systems Division

PHILIPS

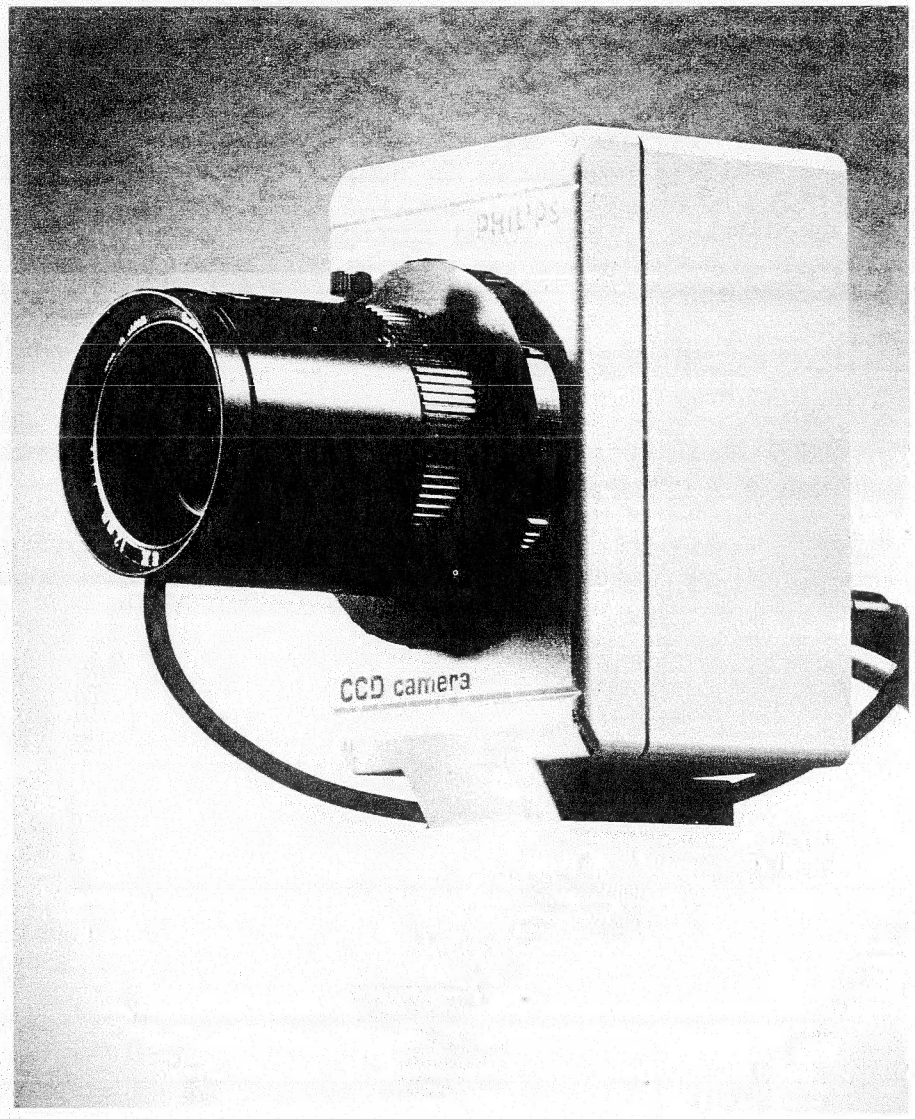
Industrial &
Electro-acoustic Systems

PHILIPS

ELECTRONIC SECURITY SYSTEMS

LDH 0600

CCD Solid state observation camera



SAFETY

Read this page carefully before installation and use of the apparatus.

Introduction

Adjustment, maintenance and repair of the apparatus shall be carried out only by qualified personnel who are aware of the hazards involved, unless otherwise indicated in the Instructions for Use.

Safety precautions

For the correct and safe use of this apparatus, it is essential that both operating and servicing personnel follow generally accepted safety procedures in addition to the safety precautions specified in this manual. Specific warning and caution statements where applicable, are found throughout the manual. Warning and caution statements and/or symbols are marked on the apparatus where necessary.

Caution and warning statements

"CAUTION" is used to indicate correct operating or maintenance procedures in order to prevent damage to, or destruction of, equipment or other property.

"WARNING" indicates a potential danger that requires correct procedures or practices in order to prevent personal injury.

MANUAL UPDATES

This page contains the update list of this service manual.

Please ensure that your manual always contains **ALL** updates.

UPDATE NUMBER	ISSUE DATE	PAGES CONCERNED	COMMENTS
0	87-04-31	Ch 1-3	Provisional
1	87-06-12	all	first issue

CONTENTS

CONTENTS

CONTENTS

1. GENERAL

The new CCD (Charged Coupled Device) camera from Philips demonstrates how the current trend towards miniaturization can be applied in the field of remote observation. The use of a solid state imaging system, does far more however, than simply enable reductions in component and product dimensions. It also opens up an extensive range of new application opportunities, not only in security and process surveillance, but also in the areas of robotics, image processing and automation systems. The camera head, type LDH 0600/.., is available in several versions for different power supplies and television standards and is one of a series of cameras and accessories designed to expand monitoring capabilities in many areas.

Compact and lightweight

The camera heads have been designed to combine miniaturization with versatility and flexibility of operation. The small dimensions and light weight mean that mounting arrangements can be simple and that the cameras can be easily concealed. The use of an image sensor also means that microphony and lag are eliminated. Because of these features, new application areas emerge - previously not suitable for traditional camera systems. These include monitoring in areas subject to vibration or shock and improved monitoring of movements, especially at lower light levels. A further benefit in industrial applications is the camera heads' insensitivity to magnetic fields.

High picture quality and good sensitivity

The 1/2" image sensor has a pixel array of 604 horizontal by 576 vertical for CCIR versions and 610 by 485 for EIA versions. This results in excellent standards of resolution of 450 tv lines.The good sensitivity enables usable pictures at light levels right down to 0.5 lux. A further benefit is their combination of good sensitivity and high picture quality under near infra-red light conditions. The camera heads also demonstrate a high resistance to burn-in. The accuracy of the imaging system enables precise image geometry over the full picture and ensures constant scanning characteristics. These features offer considerable advantages in instrumentation applications, including robotic situations where pattern recognition is essential.

Designed for versatile, flexible operation

The camera heads have a C-mount with a back-focus adjustment possibility. Circuitry is included for handling auto-iris lenses. Other circuitry includes automatic black level control, automatic gain control and gamma correction. Coaxial and balanced video are provided with connection possibilities for features like gen lock and camera identification. The -quick start- nature of the system eliminates the need for warming up times. Camera heads, types LDH 0600/00 and LDH 0600/50, operate from an external power

source of 12 Vd.c. which may be from a battery or a mains driven power supply unit. When used in conjunction with the system power supply unit, type LDH 0610/10, system options such as gen lock, mains lock and camera identification are available.

Very long life

As there is no degradation of the image sensor in terms of operating time or picture burn-in, a constantly high level of performance is assured over long periods. In consequence, all associated components and circuitry have been designed to match this long life characteristic. High reliability, offered by these camera heads, is an important economical advantage, cutting down on service and maintenance costs. It also means that monitoring can be carried out in locations where such back-up activities might prove to be a problem.

1.1 Product Range.

1.1.1 Cameras

LDH 0600/00	Indoor CCD camera CCIR 12v DC
LDH 0600/05	Indoor CCD camera EIA 12v DC

1.1.2 Accessories

LDH 4430/12	Power supply unit 220 Vac
LDH 4430/27	Power supply unit 240 Vac
LDH 4430/72	Power supply unit 110 Vac
LDH 0610/10	System Power supply unit 220 Vac
LDH 0610/15	System Power supply unit 240 Vac
LDH 0610/10	System Power supply unit 110 Vac

1.1.3 Miscellaneous

LDH 0629/02	Camera cable 2m
LDH 0629/05	Camera cable 5m
LDH 6360/00	Indoor wall stand

2. TECHNICAL DATA

2.1 Camera head LDH 0600/..

2.1.1 ELECTRICAL

Power supply voltage
: See table 1

Current consumption
: 160 mA

Ripple voltage : 100 mV max.

Video output : two parallel outputs
Coaxial output : 1.0 Vpp VBS, 75 Ohm
Balanced output : 2 x 1.0 Vpp, 120 Ohm

White limiter threshold
: 1.1 Vpp VBS

System sync. standard

CCIR sync. pulse generation 625 lines/50 Hz
or
EIA (RS170) sync. pulse generation 525 lines/60 Hz

- 2:1 interlace
- free running oscillator
  +/- 1% at 25°C
  +/- 2% from - 25° to + 55°C
- crystal oscillator (optional)
- external genlock (composite sync.)
  1 Vpp positive going pulse with 170° phase shift adjustment
- external V lock
  1 Vpp positive going pulses
- mains lock derived from the System Power Supply Unit LDH 0610/.. (optional)

Image sensor

Frame transfer imaging device
6 x 4.5 mm image area
- equivalent 1/2" tube format
CCIR versions : 604(H) x 576(V)
EIA versions : 610(H) x 485(V)

Geometry : No geometric distortion

Resolution

Horizontal : 450 tv lines
Vertical : 420 tv lines

Illumination levels

standard light source : 2856 K
lens aperture : f 1.0
lens transmission: 80%
highlight reflectance : 100%

scene illumination

for full video : 1.5 lux
for 46 dB Signal-to-Noise ratio : 10 lux

Automatic Gain Control

AGC range : 1:7

Bandwidth

5 MHz : +/- 1 dB
6.5 MHz : +/- 3 dB

Gamma correction

Preset value : 0.6
Adjustable : 0.45 to 1

Auto black

The picture level is related to the darkest spot on the picture.

M.T.B.F.(at 25°C): 100 000 hours
(including sensor)

2.1.2 MECHANICAL

Connectors

Coax.VIDEO out : BNC socket
POWER + sync. + balanced video : 8-pole Binder plug
LENS (Iris) : 8-pole Binder socket

Lenses

- Fixed iris or auto iris with 12 V supply voltage
- 1/2", 2/3" or 1" picture format
- C mount
- lens weight 1.5 kg max.

Camera mount : 1/4" Whitworth thread

Housing

Material : Die-cast aluminum
Finish : Beige

Dimensions : see drawings

Weight : 0.4 kg

2.1.3 ENVIRONMENTAL

Temperature range
Storage : - 40° to + 80°C
Operating : - 25° to + 55°C

Altitude

Operating and non operating
Air pressure : 630 to 1100 mbar

Electromagnetic interference

The camera can be used in a field strength of 10 Vpp/m (100 kHz to 480 MHz) with 1 kHz 30% AM without noticeable interference in the output signal.

RF radiation

- Interference field strength and terminal interference voltage according to : CENELEC/CISPR requirement cat.II. VDE 871 class B

Electrostatic discharge
: IEC 801-2 level 3

Vibration

According to IEC 68-2-27 test Fc Frequency range 10 to 58 Hz, amplitude 0.35 mm, acceleration 5g at 58 to 150 Hz.

Shocks

According tp IEC 68-2-27 test Ea 30g, 3 shocks in each direction.

Bumps

According to IEC 68-2-29 test Eb 10g, 3 x 1000 bumps

Humidity

According to IEC 68-2-30 test Db 40°C, 21 days

Composite temperature humidity

According to IEC 68-2-38 test 2/AD

Safety

Construction according to IEC 65 and BS 415 recommendations.

2.2 ACCESSORIES

2.2.1 Power supply unit LDH 4430/..

Mains supply voltage

LDH 4430/12 : 220 Vac +/- 10%
LDH 4430/27 : 240 Vac +/- 10%
LDH 4430/72 : 110 Vac +/- 10%

The mains transformer can be rewired for mains voltages of 110, 127, 220 and 240 V.

Mains frequency : 45 to 65 Hz

Power consumption: 14 W

Mains lead : 2-core, 2 m long

Output voltage : 11.5 V +/- 0.5 Vdc

Output current : 200 mA max.

Connections : 2 x 7-pole 270° DIN sockets connected in parallel

Temperature range: 0° to + 45°C

Dimensions (H x W x D) : 95 x 55 x 82 mm

Weight : 0.5 kg

2.2.2 System Power Supply Unit LDH 0610/..

The system power supply unit provides not only d.c. power to the CCD camera but also the following options:

- Mains lock for camera synchronization
- Camera sync. lock to external VBS.
- Camera identification by means of optional plug-in camera identification board LDH 0525/01.
- Camera two-wire output connector or 2nd coaxial video output
- Lightning protection of video outputs

The unit has 4 connectors:

- BNC video output socket
- BNC sync. input socket
- 8-pole 270° DIN socket - Camera connector
- 8-pole 270° DIN socket - balanced video output

ELECTRICAL

Mains supply voltage

LDH 0610/10 : 220 Vac + 10%, - 15%
LDH 0610/15 : 240 Vac + 10%, - 15%
LDH 0610/60 : 110 Vac + 10%, - 15%

The mains transformer can be rewired for mains supply voltages of 110, 127, 220 and 240 V.

Mains frequency : 45 to 65 Hz

Power consumption: 18 W

Mains lead : 2-core, 2 m long

Output voltage : 11.5 Vdc +/- 0.5 V

Output current : 600 mA max.

Ripple voltage : 10 Vrms max.

Camera output signals

Coaxial output : 1 Vpp VBS, 75 Ohm
Balanced video : + and - 1 Vpp, 120 Ohm
(2-wire output)

These output signals are available in parallel with the BNC coaxial output on the CCD camera.

Camera Synchronization

- Mains lock
  The unit is preset on delivery for mains lock phase shift adjustment 0^{o} or 180^{o} and 5^{o} to 160^{o} continuous.

- VB lock via BNC sync. input socket
  Input impedance : 75 Ohm or 10 kOhm
  Input voltage : - 0.8 to - 5 Vpp

- Gen lock via BNC sync. input socket
  Input impedance : 75 Ohm or 10 kOhm
  Input voltage : 1 Vpp External VBS
  or : - 0.25 to - 5 Vpp CS

- Phase shift : 1.2 us max.

- Sync. output : + 1 Vpp
  to CCD camera

M.T.B.F.(at 25^{o}C): > 150 000 hours

MECHANICAL

Connectors

Coaxial video out: BNC socket
Sync. input : BNC socket
Camera connector : 8-pole 270^{o} DIN socket
Balanced video output
: 8-pole 270^{o} DIN socket

Housing

Material : Die-cast aluminum
Finish : Brown

Dimensions : 133 x 250 x 74 mm
(H x W x D)

ENVIRONMENTAL

Same as the CCD camera head, type
LDH 0600/...

Spikes on the mains
Peaks of 500 V : no degradation of performance
Peaks of 1000 V : no damage caused

2.3. Miscellaneous equipment

2.3.1 Camera cable assembly : **for LDH 4430 or** LDH 0610 power units

LDH 0629/02 : 2 m long
LDH 0629/05 : 5 m long

Cable : 8-core, 5 mm diameter

Connectors : 8-pole Binder plug +
8-pole 270° DIN plug

2.3.2 Camera Identification Board
: LDH 0525/01

This unit inserts a four digit camera identification number into the camera output signal. The board plugs into the systems power supply unit, type LDH 0610/..

Type number	Supply voltage data	TV standard
LDH 0600/00	12 Vd.c., 160 mA	CCIR *
../50	12 Vd.c., 160 mA	EIA **

Table 1

2.4 Cable specifications

Cable type	Diameter	(40 dB) 22.5 MHz dB/100 m	(70 Ohm) R/100 m	L m
RG 59 B	6.0 mm	5.74	8.5	700
H 18	6.4 mm	4.75	6.4	900
H 40 (coax 12)	6.8 mm	3.8	6.1	1050
H 47	7.8 mm	2.65	3.0	1500
H 43 (coax 6)	9.8 mm	1.84	1.95	2200

Table 2

3 INSTALLATION AND OPERATION

The CCD Camera Head is a solid state Charge Coupled Device which,in conjunction with one of a number of recommended power supply units and a lens (with a C-mount) of your own choice.
Type LDH 0600/00 will produce fully interlaced black and white television pictures according to the CCIR standard (625 lines/50Hz), whilst type LDH 0600/50 will produce pictures to the American standard EIA (525 lines/60 Hz).

3.1. Camera mounting

Refer to Fig.1 for the dimensions of the camera head.
A 1/4" Whitworth threaded hole, (1) in Fig.1, is provided on the underside of the camera to enable mounting onto stands or brackets.
A stand suitable for indoor use, type LDH 4360/00, is available from Philips' wide range of accessories.

3.2 Earthing

In multi-camera installations where separation of the electrical and mechanical earths may be necessary, special provisions should be made to isolate the camera's body from the local mechanical earth.

3.3 Connections See (2), (3) and (4) in Fig.1.

3.3.1 Power Connections

(2) **POWER** connector: 8-pole Binder plug (see Figs.2 and 3)

Pole 1	:	Electrical earth - 0 V power supply
Pole 2 *	:	Zoom input 0 V, 6 V, 12 V
Pole 3	:	Manual gain or Identification (selected via solder bridge)
Pole 4	:	Sync. lock in
Pole 5	:	Balanced Video output (-)
Pole 6	:	Balanced Video output (+)
Pole 7	:	Power Supply + 10.5 V to + 15 V
Pole 8 *	:	Focus input 0 V, 6 V, 12 V
*	:	only available from serial no. 1000 onwards

3.3.2 Lens connections

(3) **LENS** connector
: 8-pole Binder socket (see Figs.2 and 3)

Pole 1	:	Electrical earth - 0 V power supply
Pole 2 *	:	Zoom output 0 V, 6 V, 12 V
Pole 3 *	:	Zoom output 12 V, 6 V, 0 V
Pole 4 *	:	Focus output 12 V, 6 V, 0 V
Pole 5 *	:	Iris motor
Pole 6	:	Iris Video (+)
Pole 7	:	Power Supply + 10.5 V to + 15 V
Pole 8 *	:	Focus output 0 V, 6 V, 12 V
	* :	only available from serial no. 1000 onwards

3.3.3 Video connection

(4) **VIDEO** connector
: BNC socket - 75 Ohms (see Fig.2)

3.4 Internal settings and adjustments

On delivery, the camera is free running and has no synchronization settings. A choice has to be made from either Vertical synchronization (V-pulses or Mains) or Horizontal synchronization (VBS or ECS signals), which involves opening the unit. Two internally located soldering points allow this choice to be made. See (A) and (B) in Fig.5. A third soldering point is also provided for selecting either the camera identification option (setting on delivery) or the remote manual control of the video output level (see (C) in Fig.6 and D9 in Fig.7); this also involves opening the unit. Three potentiometers are provided for the adjustment of phase shift for Horizontal synchronization (11),Video output level (12) and black level (13); see Figs. 5 and 6.

3.5 Opening the camera head

- Unscrew the slotted screw, (8) in Fig.1, and lift off the rear cover. This gives direct access to soldering points (A) and (B), and the phase shift adjustment potentiometer (11); see Fig.5.
- To gain access to soldering point (C),and to the adjustment potentiometers for the video output level (12) and the black level (13), see Fig.6, unscrew the two slotted screws,(9) in Fig.5, and hinge the printed circuit board assembly outwards.
- To gain access to the diode D9, see Fig.7, unscrew the two slotted screws, (10) in Fig.5, and lift clear the printed circuit board with the input/output connectors.

3.6 Choice of external synchronization

3.6.1 Vertical-lock

- For V-lock operation, make the solder bridge, (A) in Fig.5, on the printed circuit board.

  Note:
  Solder bridge (B) 2 and 3 which is closed on delivery, must in this case, remain closed.
- Feed the V-lock signal to pole 4 of the **POWER** connector. (pole 1 is earth)
- The camera locks to a V-lock signal which has positive pulses of 1 Vpp.

3.6.2 Horizontal lock

- For H-lock operation, remove the solder bridge (B) between points 2 and 3, and solder points 1 and 2 together.

  Note:
  Solder bridge (A) which is open on delivery, must in this case, remain open.
- Feed the H-lock signal to pole 4 of the **POWER** connector. (pole 1 is earth)
- The camera locks to a composite sync. signal which has positive pulses of 1 Vpp.
- The camera has an internally mounted control, (11) in Fig.5, for phase shift adjustment of up to 175°.
  For the correct adjustment procedure refer to Chapter 4 ADJUSTMENTS.

Note:
If the CCD systems power supply unit, type LDH 0610/..,is used, the same selection for Vertical or Horizontal-lock has to be made by means of a solder bridge setting on the under side of the power supply unit's printed circuit board. Details are given in the Instructions for use;
code number 3922 988 08611.
Mains lock and sync. lock to another camera output signal is possible in combination with the CCD systems power supply unit, type LDH 0610/...

3.7 Video output

The camera head has two video outputs which can be used independently.
- Standard video output via a 75 Ohm coaxial BNC socket 1 Vpp VBS {see (4) in Fig.1}

- Two wire balanced video output via 8-pole Binder plug 2 x 1Vpp VBS {see (2) in Fig.1}

Connection points for the balanced video output are available on both of the recommended power supply units.

The video output signal level (white level) and the black level are both set during manufacture and there should normally be no need to make any readjustments.

If problems occur, however, when setting up the iris, the white level in the picture and the black level may be readjusted to suit the ambient lighting levels by means of, respectively, potentiometers (12) and (13) on the video processor board; see Fig. 6.

By means of a small adjustment to both the camera and the CCD systems power supply unit, type LDH 0610/.., the gain of the video amplifier circuit may be remotely manually controlled.

This option is an alternative to the camera identification option. It is not possible to have both manual control of the video signal and camera identification at the same time.

3.8 Camera identification

Camera identification can be added to the video output signal. This option is made possible by adding the identification board, type LDH 0525/00, to the CCD systems power supply unit, type LDH 0610/...

The identification signal is fed into the camera on pole 8 of the **POWER** connector.

A solder bridge, (C) in Fig.6, which can be found on the printed wiring side of the Video processor board (the middle one of the three printed circuit boards) should be closed between points 2 and 3. This is the standard situation on delivery.

3.9 Manual gain

An alternative to the camera identification option is the remote manual gain adjustment for the video output level.

The solder bridge on the Video processor board, (C) in Fig.6, must be made between points 1 and 2 and diode D9 on the component side of the board must be removed. The location of diode D9 is shown in Fig.7.

Note:
If the CCD systems power supply unit, type LDH 0610/.., is used, the selection for either Manual gain or Camera identification has to be made by means of a solder bridge on the power supply unit's printed circuit board. Details are given in the Instructions for use:

code number 3922 988 08611.

3.10 Power supplies

The following types of power supply units are suitable for driving the camera head;

LDH 4430/12 for 220 V, 50 Hz mains supplies,
LDH 4430/27 for 240 V, 50 Hz mains supplies,
LDH 4430/72 for 110 V, 60 Hz mains supplies.

Each of the above mentioned power supply units has two 7-pole 270° DIN connectors which are wired in parallel. See Fig.4.
These connectors carry not only the power supply voltages but also the balanced video output.

Pole 1	: + 12 V
Pole 2	: 0 V
Pole 3	: Identification
Pole 4	: Sync. lock
Pole 5	: Balanced video (-) input/output
Pole 6	: Balanced video (+) input/output
Pole 7	: Zoom

LDH 0610/10 for 220 V, 50 Hz mains supplies,
LDH 0610/15 for 240 V, 50 Hz mains supplies,
LDH 0610/60 for 110 V, 60 Hz mains supplies.

Each of the above mentioned power supply units has a BNC video output connector, a BNC sync. input connector and two 8-pole 270° DIN connectors, one for camera connections and the other for the input and output connections to the system monitors and remote control equipment.

Power connector : 8-pole 270° DIN socket

Pole 1	: + 12 V
Pole 2	: 0 V Electrical earth
Pole 3	: Manual gain or Identification
Pole 4	: ECS or V-lock
Pole 5	: Balanced video input (-)
Pole 6	: Balanced video input (+)
Pole 7	: Zoom output
Pole 8	: Focus output

System connector : 8-pole 270°DIN socket

Pole 1	: + 12 V Power supply
Pole 2	: 0 V Power supply - Electrical earth
Pole 3	: not connected
Pole 4	: ECS
Pole 5	: Balanced video output (-)
Pole 6	: Balanced video output (+)
Pole 7	: Remote control input
Pole 8	: Remote control input

In addition, these power supply units provide the following camera system options:
Camera sync. lock: mains lock
: external V-lock
: lock to second camera video signal

Camera identification
: by optional plug-in printed circuit board, type LDH 0525/00

3.11 Power Cables LDH 0629/02 0629/05

Cable assemblies, type number LDH 0629/02 and 05, are available for interconnecting the camera head to either of the two types of recommended power supply units. These cable assemblies are respectively 2m and 5m long and are terminated at one end with an 8-pole Binder socket and at the other end with a 7-pole 270° DIN plug. See Fig.4.

8-pole Binder	Function	7-pole DIN
1	GND	2
2	Zoom	7
3	Ident/Man. gain	3
4	Sync.	4
5	Video (+)	5
6	Video (-)	6
7	+ 12 V	1
8	Focus	n.c.

Interconnections Power Cable

3.12 Lenses

The camera head, type LDH 0600/00, has a C-mount lens fitting with a back-focus adjustment ring. Circuitry is included to handle auto-iris lenses. Manual iris lenses can be used but auto-iris lenses are recommended.

The choice of a particular lens is determined by;
a. The required angle of view.
b. The minimum illumination level of the area to be monitored.

Tables 3 and 4 show the relevant data for current lens types.

Focal length	Horiz. angle of view
6.5	50
8	41
10	33
12.5	27
16	21
25	14
50	6.9
75	4.6

Table 3

f-number	Nominal Illumin. lux	Minimum Illumin. lux
0.95	9	1.4
1.2	14	2.2
1.4	20	3.0
1.6	26	3.8
1.8	32	4.9
2.0	40	6.0
2.2	48	7.3
2.8	78	12

Table 4

3.13 Cleaning the sensor

If the need arises to clean the surface of the sensor, (7) in Fig.1, do not attempt to clean it with a cloth, or cotton buds and/or any of the normal cleaning fluids.
Only use clean dry air to blow away particles from the surface of the sensor. Recommended clean air sprays are available in aerosol cans.

4. ADJUSTMENTS

4.1 Fitting the lens and adjusting the focus

- Remove the dust cover (5) in Fig.1
- Screw the back-focus ring (6) on the C-mount as far as possible towards the camera head.
- Screw the lens a few turns into the C-mount

Caution

Check that the lens protrusion behind the C-mount does not touch the dust ring in front of the sensor.

- Set the lens distance to infinity.
- Connect the lens cable (auto-iris lenses) to the LENS connector on the rear of the camera head.
- Connect the camera to the power supply unit and switch on.
- Aim the camera at an object which is over 15 m away.
- Make a preliminary lens adjustment (See **Iris adjustment**)
- Screw the lens further into the C-mount until the picture is sharp.
  This adjustment is most accurate with the iris fully open. Use a neutral density filter if necessary.
- Screw the back focus ring so that it is tight against the rear flange of the lens.
- When large diameter lenses are being fitted, a small hole in the back focus locking ring may be used when locking the lens. A small metal bar is delivered with each camera for this purpose.

4.2 Iris adjustment

4.2.1 Manual iris

- Adjust the iris to minimum aperture.
  The camera will now show a low contrast picture with noise.
- Gradually open up the iris aperture.
  The picture contrast will improve and the noise will reduce.
  The automatic gain control will, for a few aperture stops, keep the picture contrast constant whilst the noise content in the picture is reduced.
- Set the iris to the position at which the larger white parts of the picture are just not washed out.
- If the picture contains too much noise while the larger white parts of the scene are washed out, readjust the video level by means of potentiometer (12); see Fig.6.
- If some parts of the scene are too dark some improvement may be gained by careful adjustment of potentiometer (13).

4.2.2 Auto-iris lens

- Set the peak-average potentiometer on the lens to its mid position.
- Turn the level potentiometer on the lens until the iris closes to its minimum aperture.
  The camera will now show a low contrast picture with noise.
- Gradually turn the level potentiometer to open up the iris.
  The picture contrast will improve and the noise will reduce.
  The automatic gain control is operative.
- Set the level potentiometer to the position at which the larger white parts of the picture are just not washed out.
- If the picture contains too much noise while the larger white parts of the scene are washed out, readjust the video level by means of potentiometer (12); see Fig.6.
- If some parts of the scene are too dark some improvement may be gained by careful adjustment of potentiometer (13).

4.3 Alternative Gamma Values.

The gamma correction may be varied within 0·45 to 1 by changing the values of the resistors R29 and R32 according to the following table.

Gamma	R29	R32
0·45	1K2	10K
0·6 *	1K5	18K
0·8	1K8	33K
1·0	2K2	100K

* Standard value

5. SERVICE ADJUSTMENTS

5.1 Test Equipment

- Oscilloscope min. 50 MHz
- Power supply 12 V/200 mA
- Monitor
- RMA resolution test chart or slide
- 2856 K light source incandescent lamp for lighting chart or slide projector (e.g. Ernitec).
- Luminance meter when using the test chart or a target lux meter (e.g. Ernitec) when using the slide projector.
- A small (e.g. 10% of image height) highlight consisting of a lamp with a reflector and a luminance of approximately 32 times (5 lens stops) the luminance of the test chart. This highlight shall be in or near the plane of the test chart in order to achieve a sharp image of the test chart and the highlight at the same time.

5.2 Opening the camera

- Unscrew the two M3 screws rear side of the camera interface board.
- Hinge the interface board and the video board upwards.
- The electronic circuitry is split up over three printed circuit boards.
- The board which is fixed directly to the camera's housing is the Sensor Board.
- The middle board is the Video Board.
- The rear board with the connectors is the Interface Board.

5.3 Camera with a manual controlled lens

5.3.1 Adjustment of the video level nominal gain setting.

- Aim the camera with the manual controlled lens at a test chart.
- Adjust the iris of the lens to obtain a 250 mV video signal on MP 1 on the interface board.
- Adjust the nominal gain potentiometer, marked VID, on the video board, to obtain a video output signal of 700 mV at the VBS output loaded with a 75 Ohm termination resistor. (1 V video with composite sync.)

5.4 Camera with an Auto-iris lens

5.4.1 Adjustment of the video level nominal gain setting

- Aim the camera fitted initially with a manually controlled lens at a test chart.
- Adjust the iris of the manually controlled lens to obtain a 250 mV video signal on MP 1 on the interface board.
- Adjust the nominal gain potentiometer, marked VID, on the video board, to obtain a video output signal of 650 mV at the VBS output loaded with a 75 Ohm termination resistor. (1 V video with composite sync.)
- Replace the manual controlled lens with an auto-iris lens.
- Adjust the video output potentiometer on the auto-iris lens to obtain a 700 mV video signal at the VBS output.

5.4.2 Black level adjustment

- Adjust the black level potentiometer on the video board, marked BL so that the darkest parts of the scene are between 10 and 20 mV above the blanking level.

5.4.3 How to recover a picture

- On the sensor board are six potentiometers which are preset in the factory during manufacture.

CAUTION

Do not turn these potentiometers unnecessarily if the camera is operating satisfactorily.

Only in the case of a lost or distorted picture might it be necessary to readjust these settings.

5.4.4 Fault finding in the case of a lost picture

- Check if there are sync. pulses on the video output.

  If there are no sync. pulses;

  1. check the power supply voltage
     - MP 1 interface board + 10 V
     - MP 2 interface board + 20 to + 22 V

  2. check if there is a video signal on connector X5-1 on the video board.

  3. check if there is a video signal on MP 1 on the video board.

  4. check if there is a video signal on connector XD-11 on the sensor board.

  5. check that the d.c. level and the superimposed video on the base of TS8 - 10 are equal.

  6. check that the d.c. and video levels at OT, OM and OB are equal.

CAUTION

DO NOT SHORT CIRCUIT OT, OM AND OB BECAUSE THIS WILL DEFINITELY DESTROY THE SENSOR.

  7. If the above mentioned are available and/or equal, and there is still no picture, check the sensor driver pulses.

5.4.5 General check of sensor driver pulses

Check the following on connector XD

XD-13 : gnd
XD-14 : + 10 V +/- 10 mV, current less than 60 mA
XD-15 : 22 V +/- 20 mV, current less than 3 mA

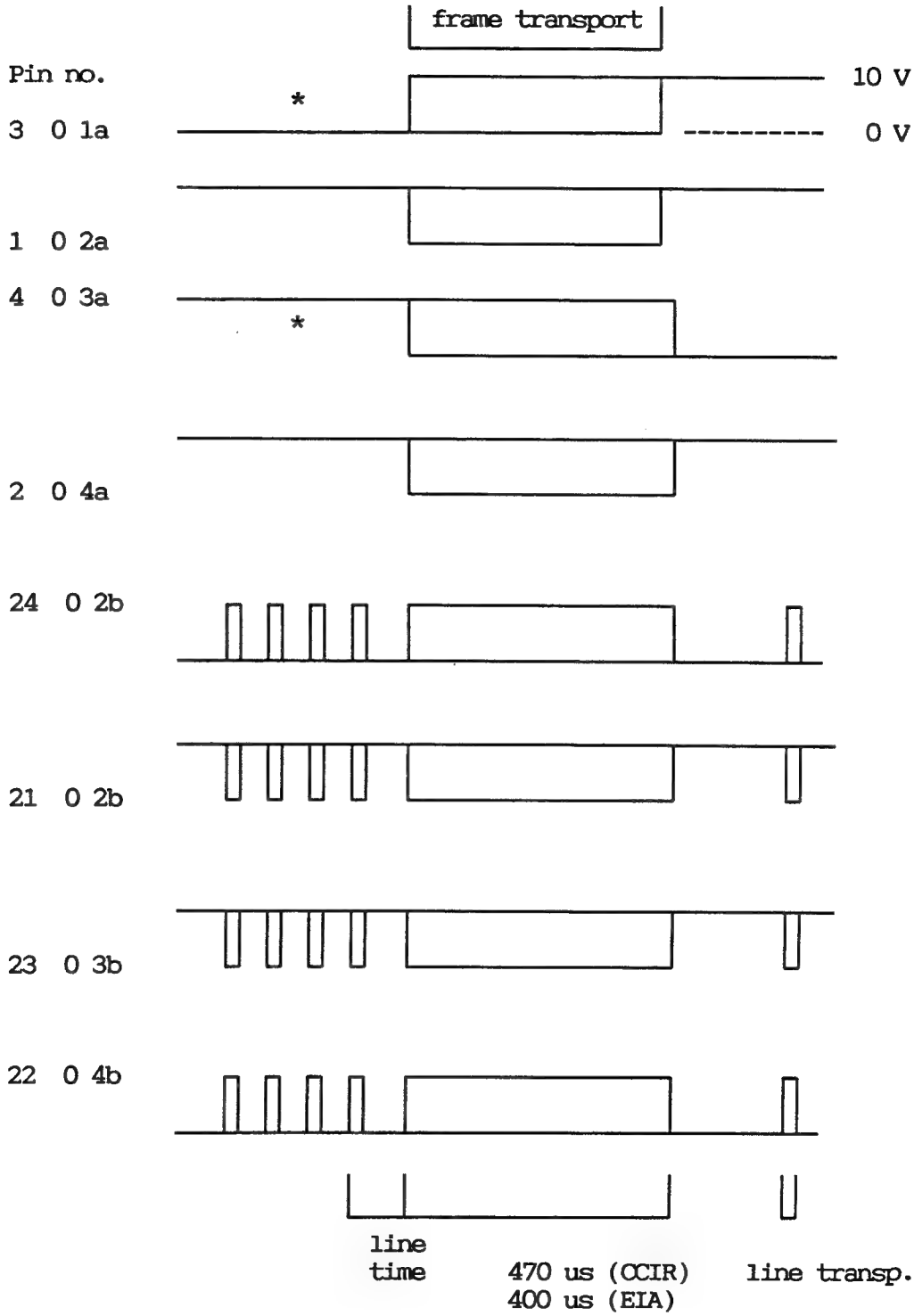
XD-8 : V pulse present
XD-6 : CB pulse, low level = 2 V +/- 0.3 V
XD-5 : CS pulse, high level = 8 V +/- 0.3 V

XD-10 : BLC positive pulse
frame period = 20 ms for CCIR
= 16.7 ms for EIA
: BLC vertical pulse = 50 micro seconds
Low = 0
High = 10 V +/- 0.3 V

Check the presence of pulse patterns on sensor inputs of IC4

All pulses have an amplitude of 10 V +/- 0.25 V.

Trigger the oscilloscope with the V pulse and use a delayed time base.



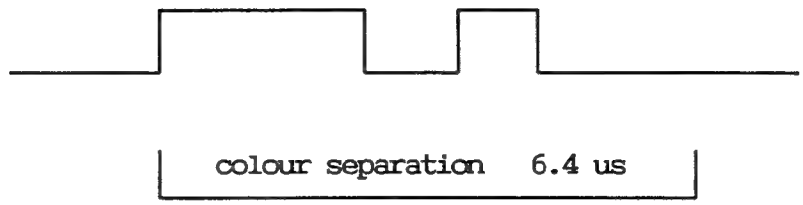
* Alternating per field
This situation for odd —— even field

Pin no.

16 TG 1

Check that the d.c. shift possibility with R11 is more than 15 V.
Set low level of pulse at + 5 V.

17 TG 2

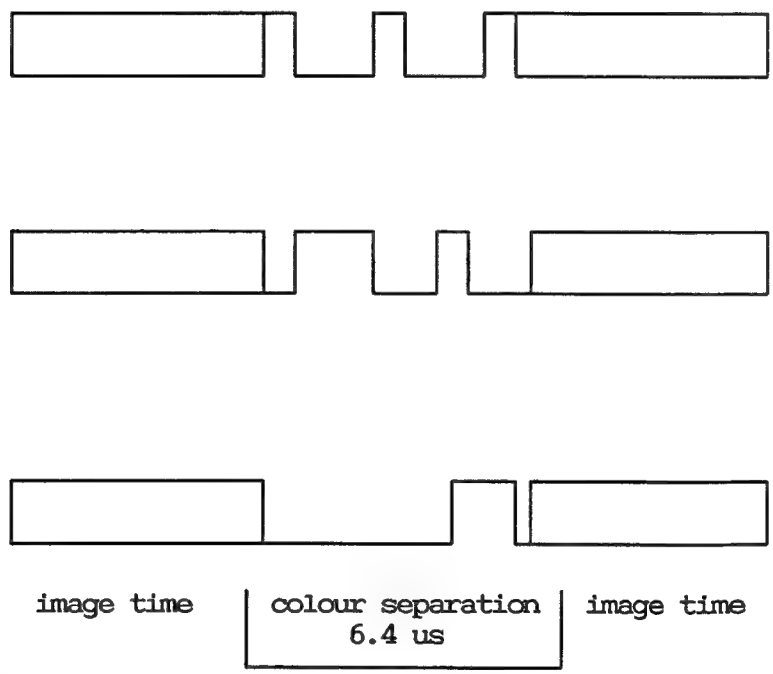


Check that the d.c. shift possibility with R9 is more than 15V.
Set low level of pulse at + 10V.

15 0 1c

14 0 2c

13 0 3c



Check that the d.c. shift possibility for 0 C with R17 is more than 15 V.
Set low level of pulses at + 3.5 V.

The following checks should also be made;

- Check that the d.c. shift possibility is 15 V with R5 on pin 20 (PS).
- Set the d.c. level to 0 V.
- Check that the d.c. shift possibility is 15 V with R6 on pin 6 (OG).
- Set the d.c. level to + 8 V.
- Check that the d.c. shift possibility is 19 V with R7 on pin 7 (RD).
- Set the d.c. level to 19 V.
- Check that the d.c. level is 0 V on the following pins;

  pin 9 (SFS)
  pin 18 (IG)
  pin 5 (LS)

- Check that the d.c. level is 22 V on the following pins;

  pin 19 (IN)
  pin 8 (NS)

The previous d.c. settings for Psub, OG, RD, TG1, TG2 and OC are course adjustments.

For fine adjustments the following steps should be taken.

5.4.6 Setting up procedure for the sensor controls.

NOTE: This procedure only holds true provided the sensor voltages have been preset according to the test instructions for the latest version of the sensor board.

Check that the pulse amplitudes on the pins 1 upto and including 4 and 21 upto and including 24 are at least 9 Vpp during vertical transport (trigger with V-pulse).

Apply as much light to the sensor - using the MA chart or slide- as is needed to obtain a 250 mVpp negative video signal on MP 1 on the video processor board, i.e. the nominal level.
This level holds good for the test chart image only and not for the highlight.

a. Adjust R5 (Psub) just as much as is necessary to remove any bloom effects.

NOTE: A. Do not confuse bloom effect with vertical smear, which is inherent to a frame transfer sensor.
Vertical smear is visible as a set-up of the black level under and above the highlight with a constant level over the whole picture height.
Bloom effect, however, is caused by a charge overflow with a highlight and is visible as an irregular extension of the image of the highlight especially in the vertical direction. ("Icecream" effect).

B. If Psub is set too high, then saturation effects appear even at the nominal level.
So do not set Psub higher than is necessary to remove the bloom effect.

b. If vertical knurls ("teeth") under white surfaces of the test image are visible, then adjust R11 (TG 1) clockwise a little (decrement). If horizontal smear after white surfaces is visible , then adjust R17 clockwise a little.

NOTE: With some sensors, this smear effect starts with a reflection like character.

c. Close the iris until the picture content is only noise; a video output of approximately 100 mVpp, apart from the highlight.
If vertical stripes are visible, then adjust R7 (RD) and/or R17 (OC) a little, but be aware of possible horizontal smear effects. Some sensors need a small adjustment of R7 and R17 to decrease the level of spurious signals.

NOTE: If TG 2 is too high then horizontal smear appears with highlight levels.

d. Open the iris again for nominal level and check the performance of the image. If any of the effects, described above, appear, then repeat the adjustment procedures described in a, b and c above.

e. Adjust for the out-of-balance between the sensor outputs, which is visible as a vertical stripe pattern in white and grey (3.75 MHz), with R48 and R49. The out-of-balance shall be less than 2% of peak white level.

NOTE: A. Do not confuse the out-of-balance in white with an out-of-balance in black, which can appear if the Black Tracking Control does not operate because of some defect.

B. An out-of-balance of less than 2% in the video output means that the 3.75 MHz stripe pattern is just invisible on the monitor. The amplitude of this out-of-balance at 3.75 MHz at peak white is expressed as less than 14 mVpp with a video signal level of 700 mVpp (at minimum gain).

C. Each re-adjustment or contact by hand of the sensor driving circuit and the Video Pre-Processor, causes an alteration of the black tracking. As the Black Tracking Control operates very slowly, the adjustments have to be carried out in small increments.

D. Always use an insulated screwdriver because TG 1 and TG 2 are very sensitive to leakage currents which would cause a misadjustment.

5.5 Adjustment of the video level minimum gain setting

5.5.1 Initial State

- Make the solder bridge for Character Identification configuration.
- Connect MP 7 to MP 9 for fixed minimum gain.

5.5.2 Adjustment procedure

- Fit a manually controlled iris lens onto the camera.
- Aim the camera at a test chart.
- Adjust the iris to obtain 250 mVpp negative video signal at MP 1 on the Video Board.

a. Display the terminated video output on connector X5-1 (VBS). The sync. amplitude is 300 mV +/- 30 mVpp. The video signal is clipped at 800 mV +/- 40 mVpp, because the minimum gain, at this stage, has not been adjusted.

b. Determine the value of the S.O.T. resistor R6 to obtain 700 mV +/- 70 mVpp at the terminated output.

Note: Decrease R6 from a starting value of 200 kOhm. Mount a resistor for R6 which is within 5% of the determined value.

c. Check that R65 controls the black level by +/- 100 mV. Adjust R65 for 10 mV set-up in the video signal.

d. Disconnect MP 7 from MP 9. Increase the input attenuation by 2 dB.

e. Check that the nominal gain control, R62, now controls the video level from 600 mV up to 800 mVpp. Adjust R62 to obtain 700 mVpp at the video output.

f. Check that the output signal on connector X5-2 is the inverse (negative video signal) of the output on X5-1.

g. Check the AGC range by increasing the input attenuation. The minimum range is 16 dB (40 mVpp at MP 1).

Note: The end of the control range is the point at which the control voltage at MP 7 suddenly increases to its maximum value (approximately 9 V).

7. SPARE PARTS

Service code	Description	Item
5322 212 40078	Sensor board LDH0600/00	
5322 212 40077	Sensor board LDH0600/50	
5322 212 40079	Video processor	
5322 212 40081	Interface board	
5322 265 40655	Binder Connector male plug	
5322 267 50738	Binder Connector female plug	
5322 267 10004	Plug coax female	
5322 323 50094	PCB interconnection cable	

8. DRAWINGS

8.1 Camera Dimensions

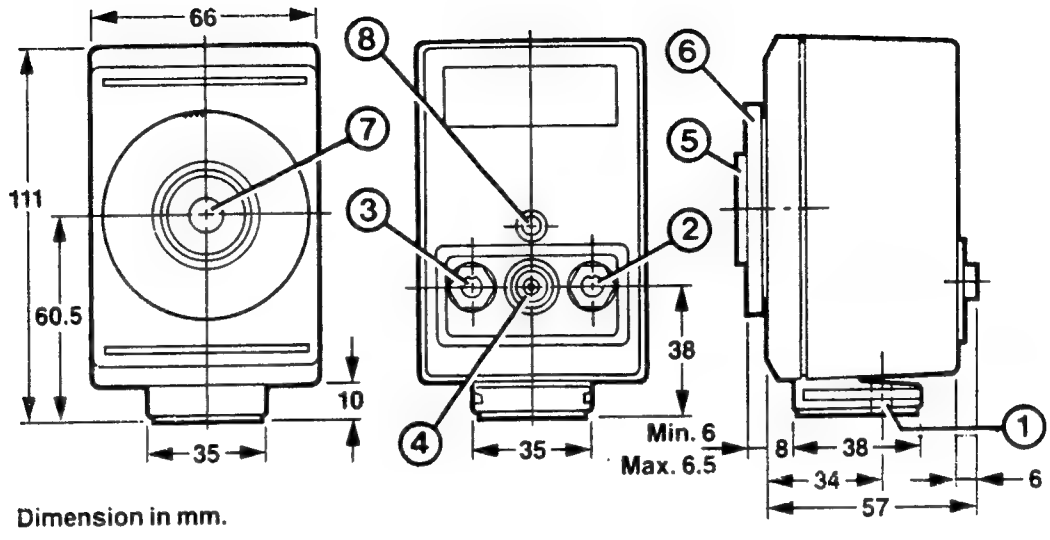


Fig. 1

8.2 Camera Connections

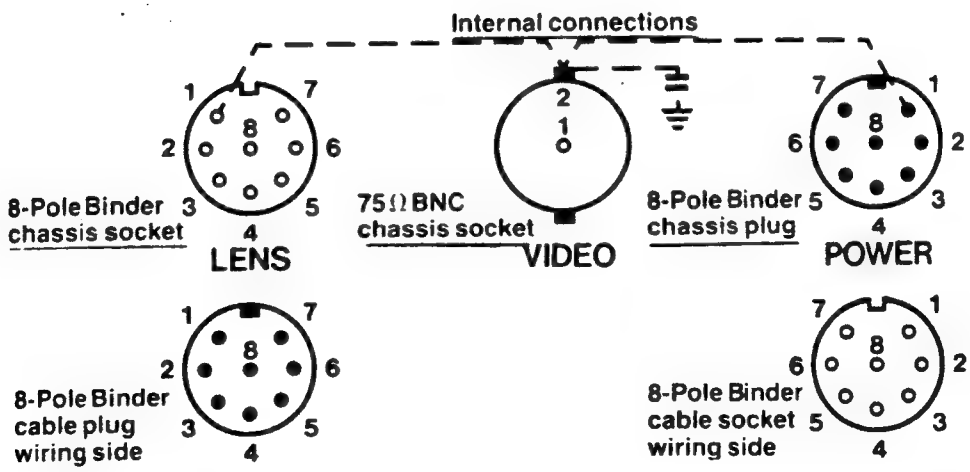


Fig. 2

8.3 Binder Connector Exploded View

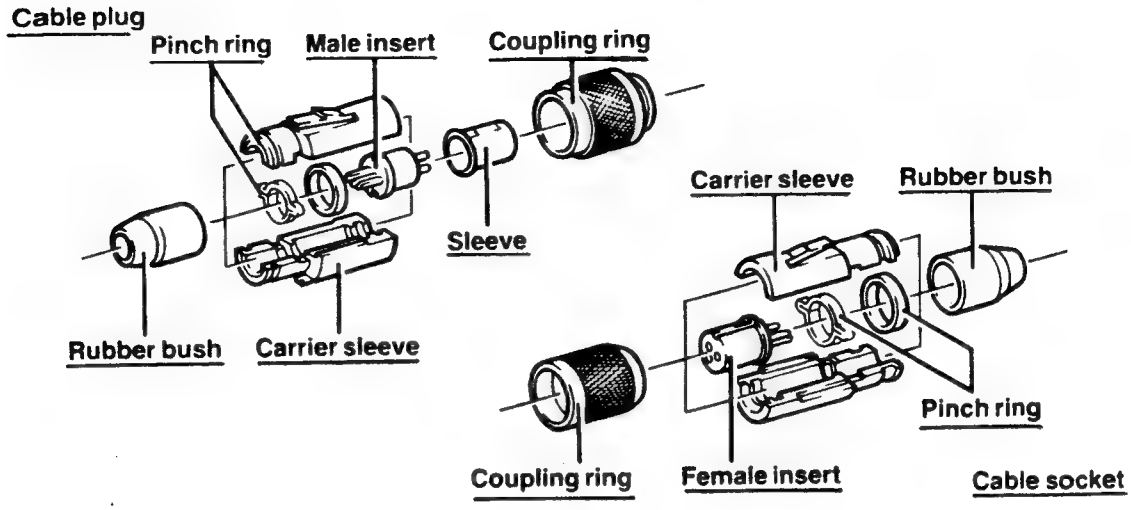


Fig. 3

8.4 Camera Power Cable

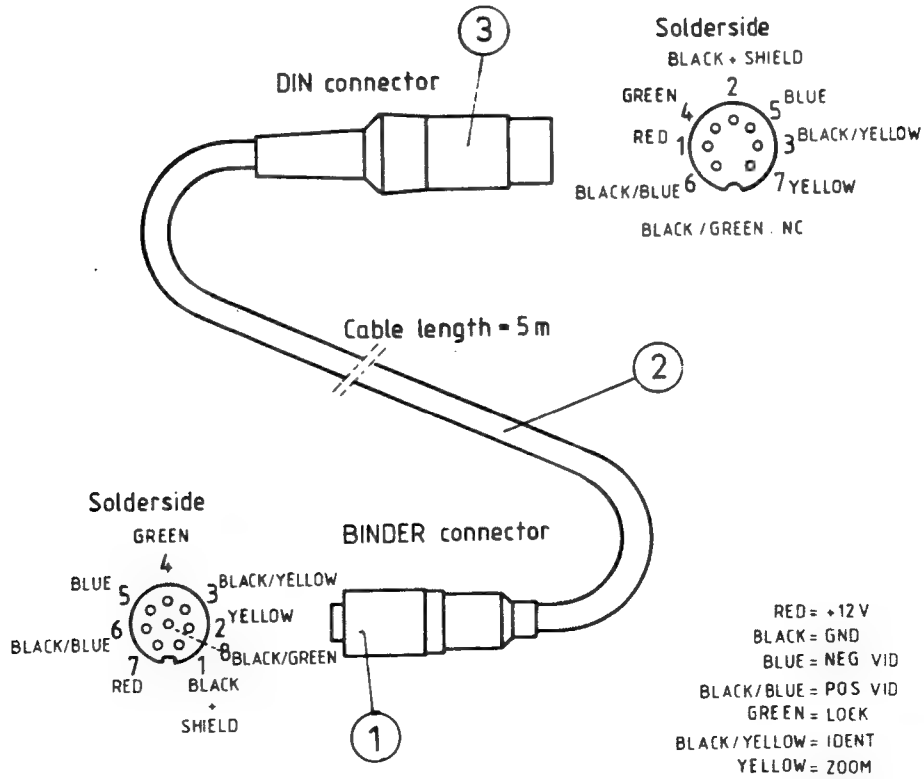


Fig. 4

8.5 Solder Bridges

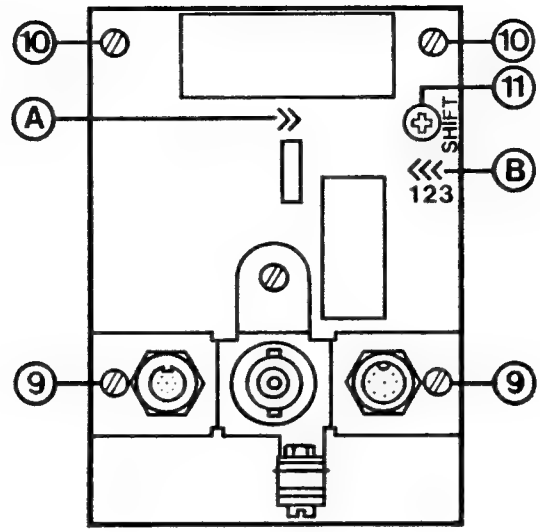


Fig. 5

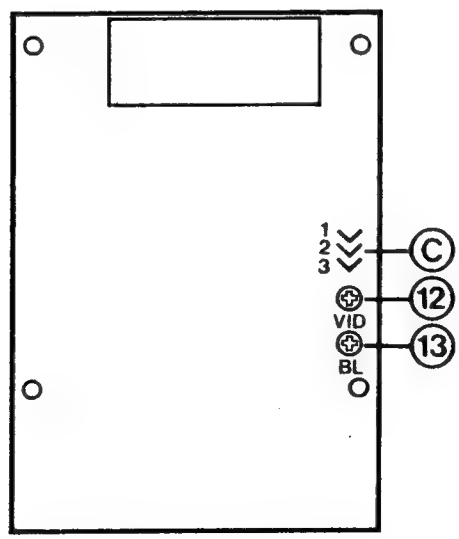


Fig. 6

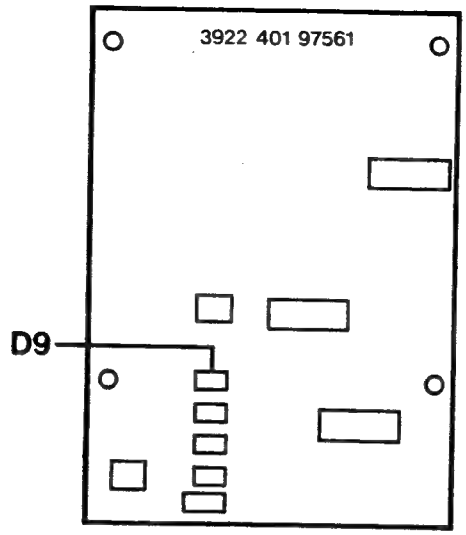


Fig. 7

8.6 PCB Interconnection Cable

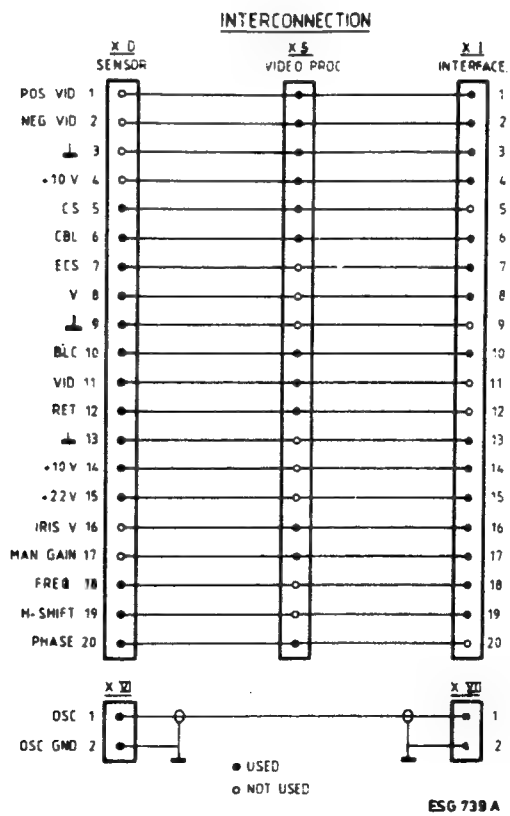
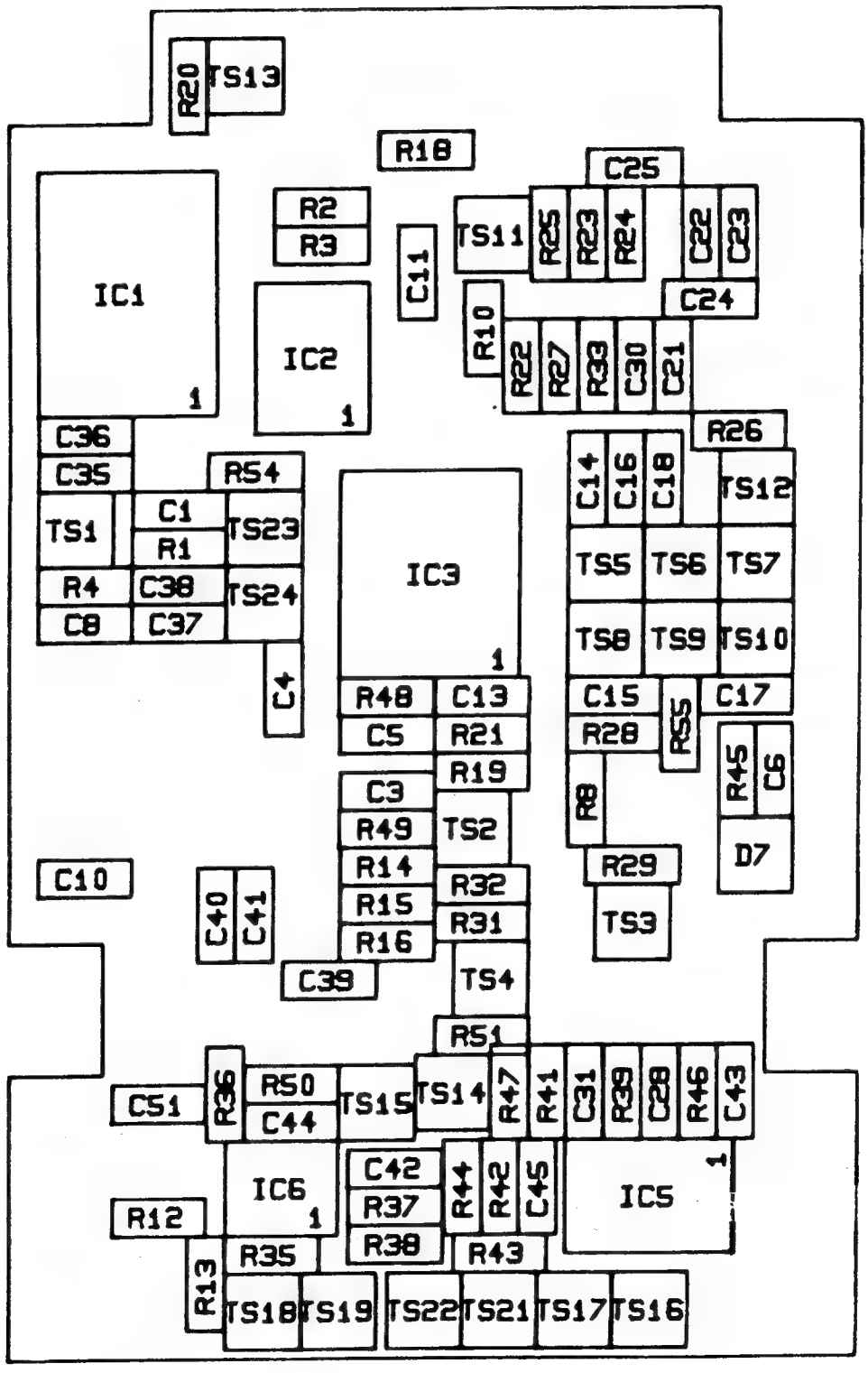


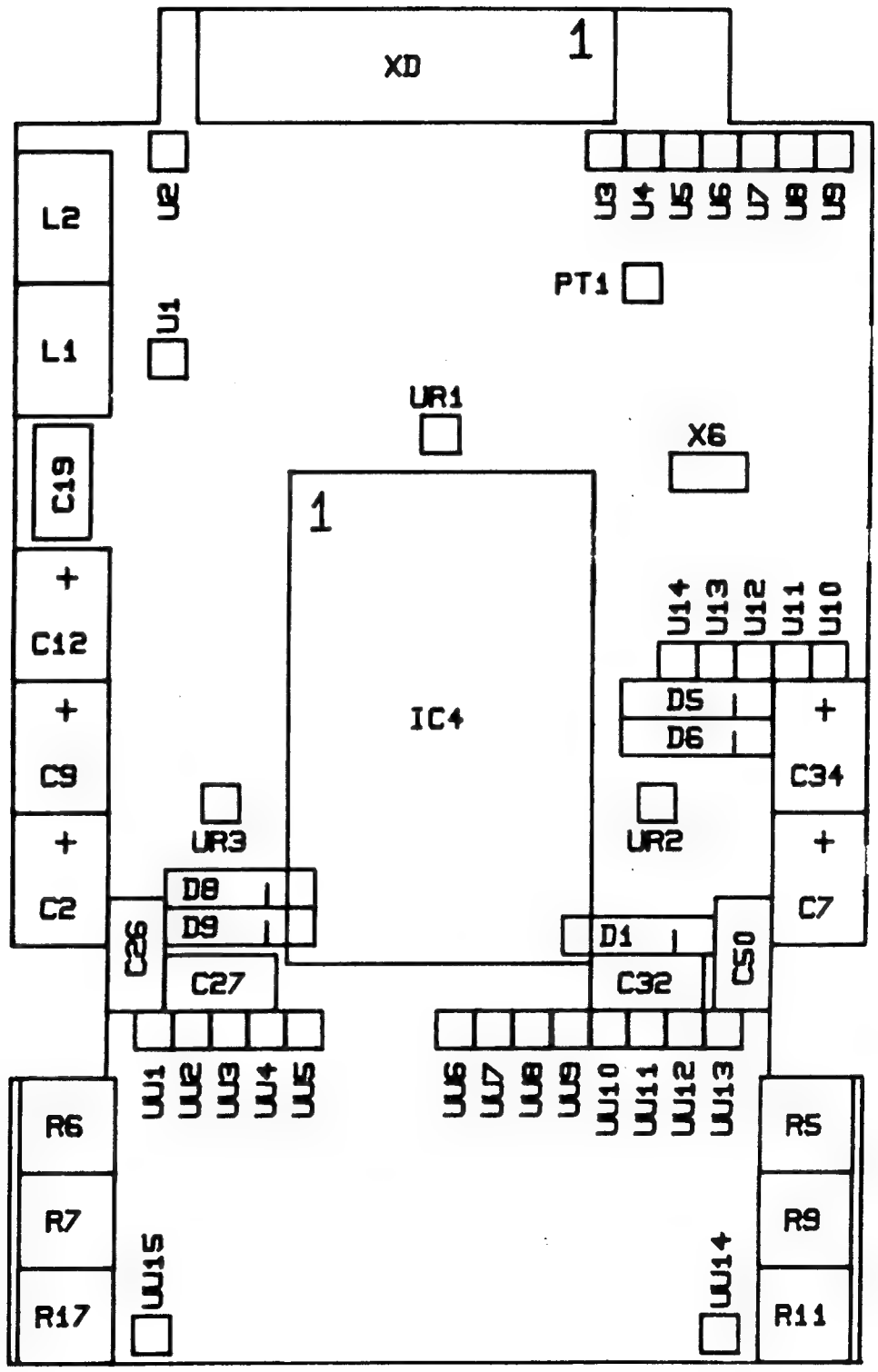
Fig. 8

8.7 Sensor Board Layout

8.7.1 Sensor Board Layout (SMD side)

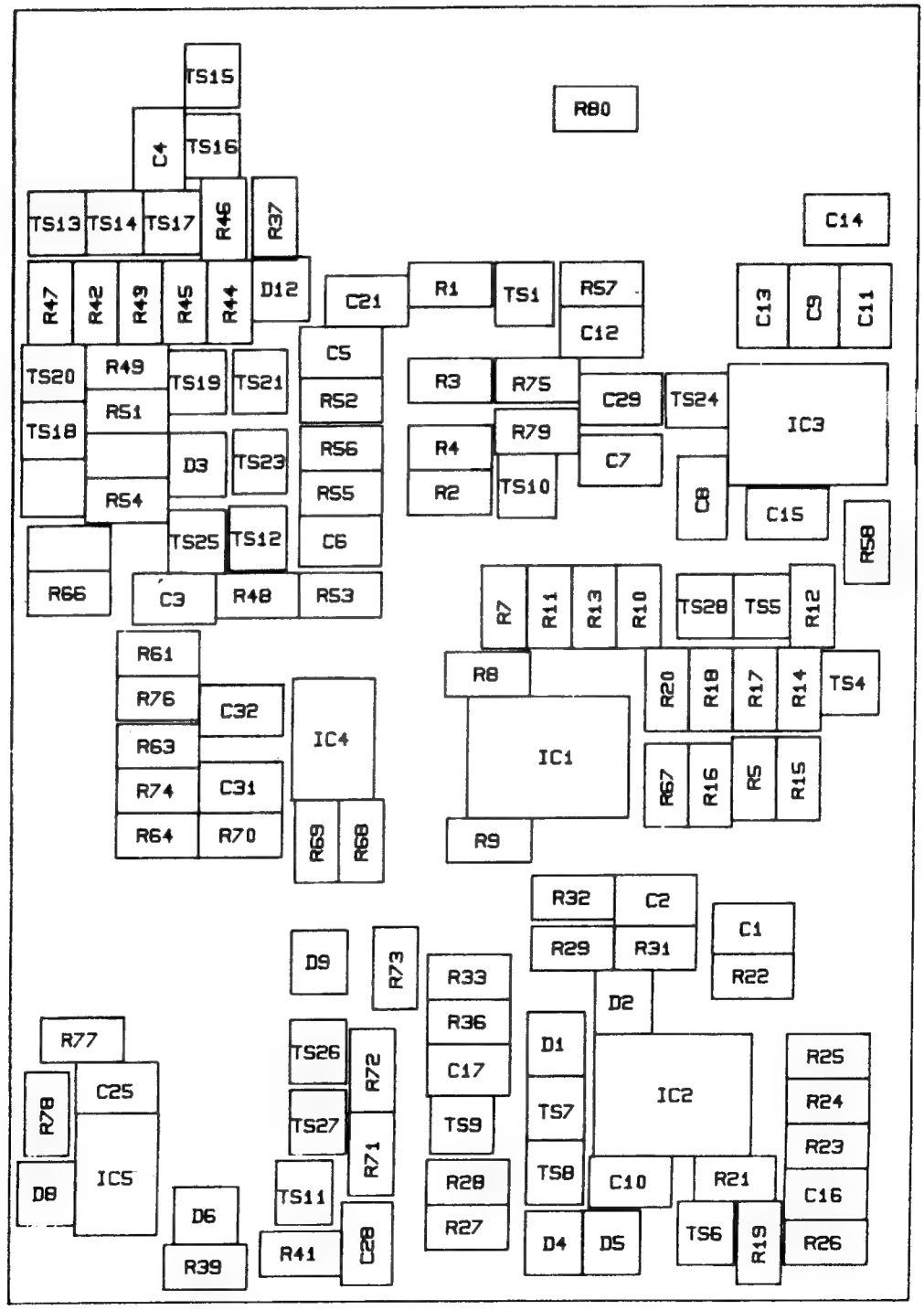


8.7.2 Sensor Board Layout (component side)

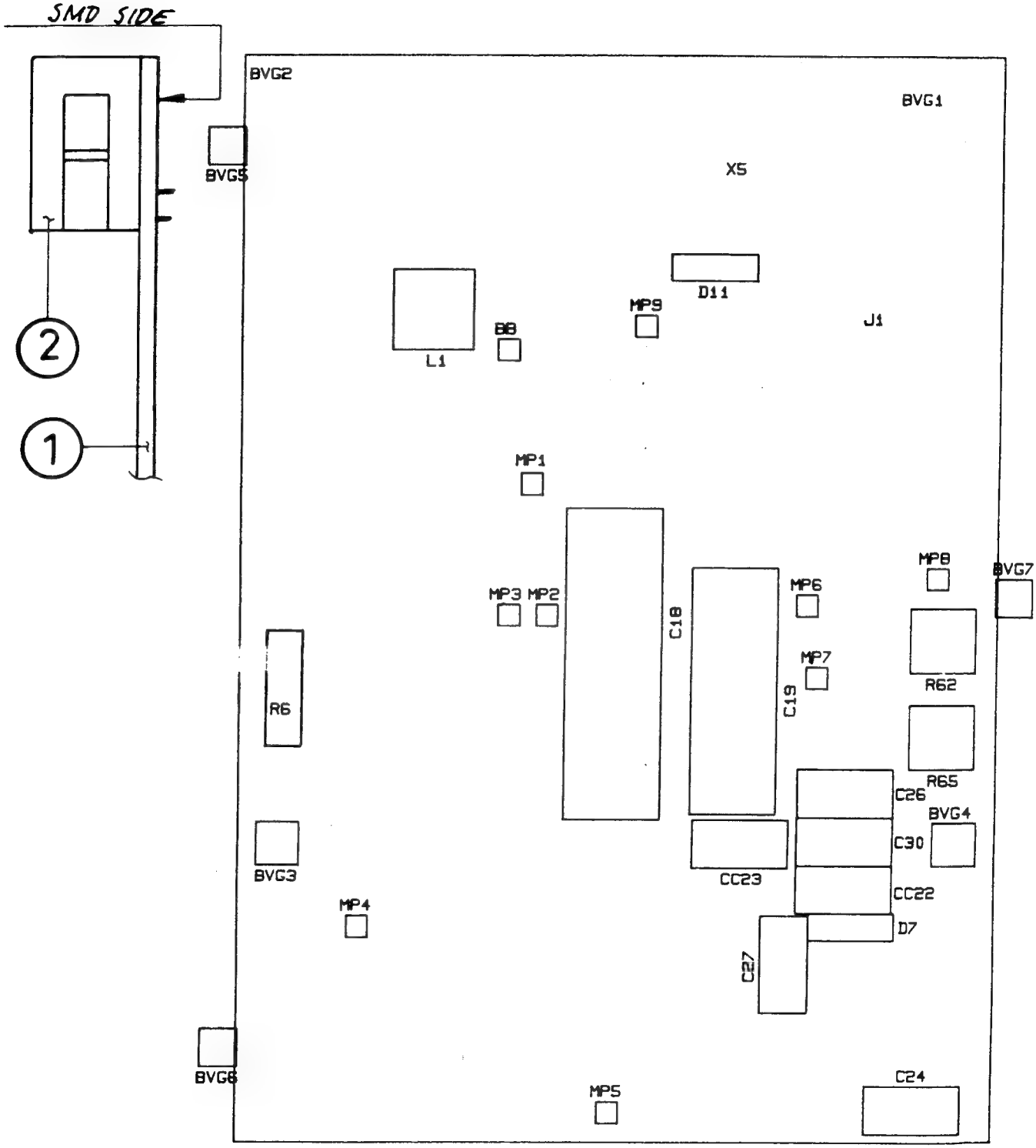


8.8 Video Board Layout

8.8.1 Video Board Layout (SMD side)

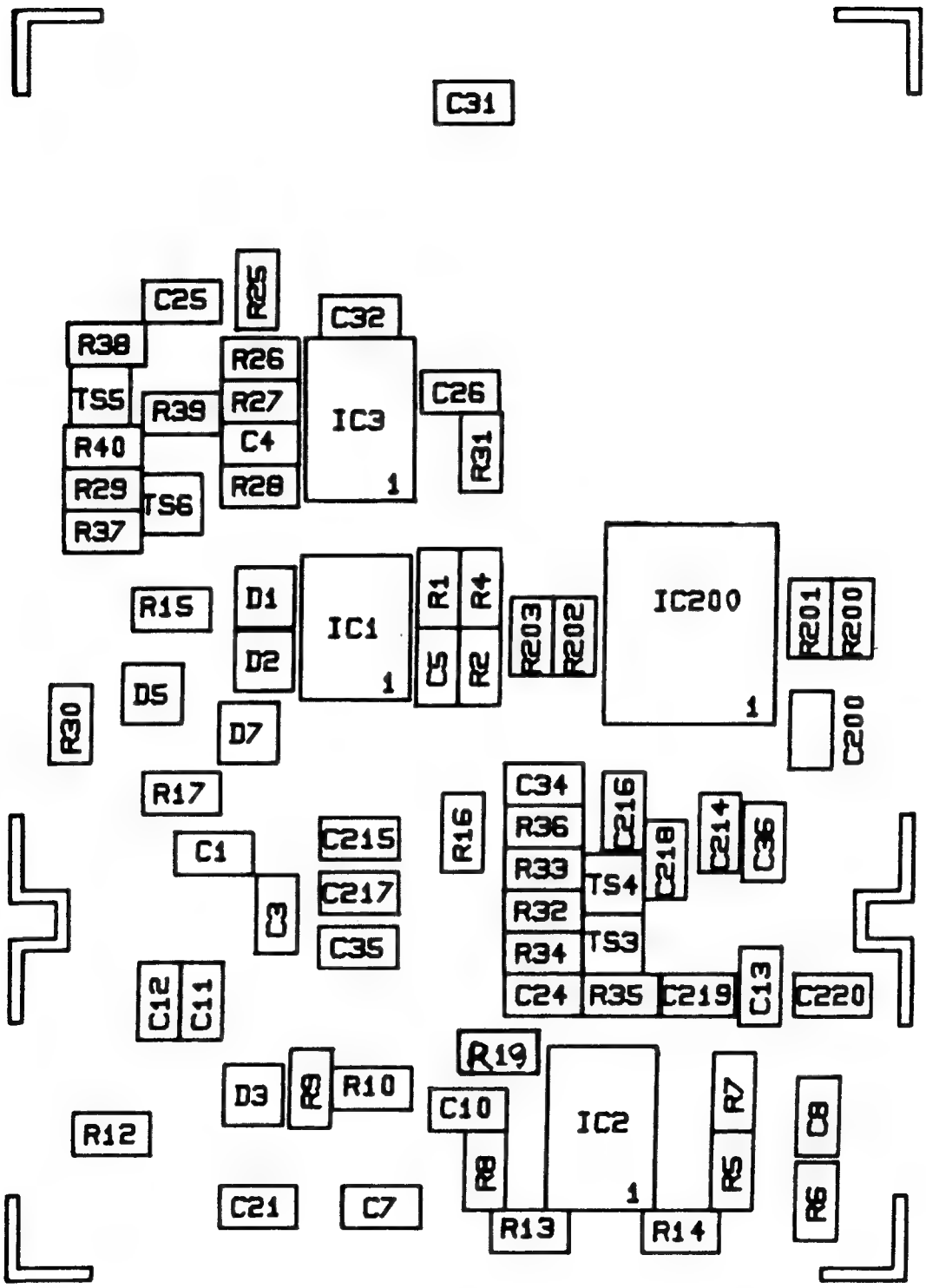


8.8.2 Video Board Layout (component side)

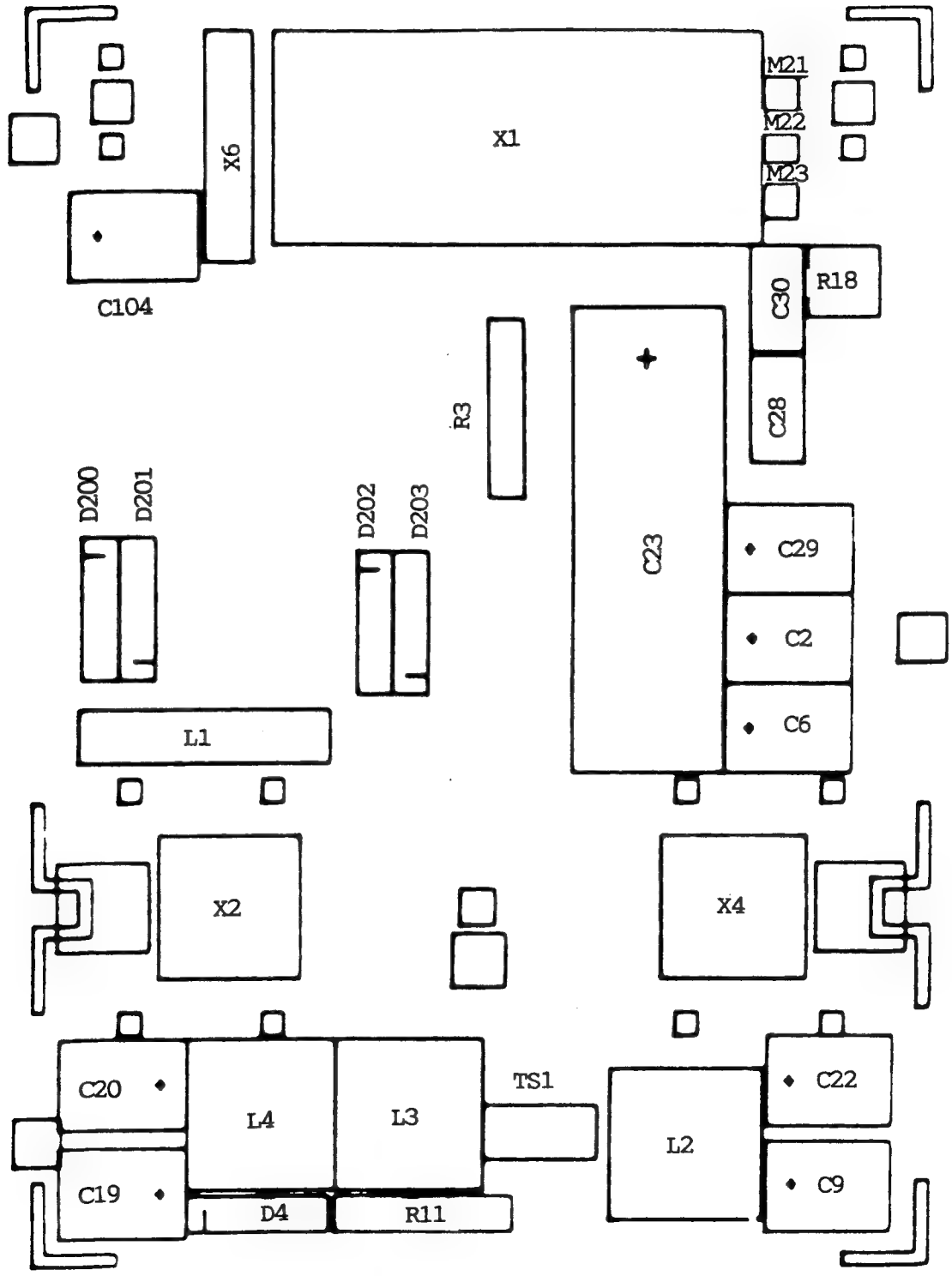


8.9 Interface Board Layout

8.9.1 Interface Board Layout (SMD Side)



8.9.2 Interface Board Layout (component side)



APPENDIX

REPLACING SURFACE MOUNTED DEVICES

General

Replacing Surface Mounted Devices (SMD's) or chip components is possible with simple tools, however some essential points should be clear and be taken into account.

The SMD can handle rather high temperatures but metallized silver palladium soldering faces will dissolve in the soldering tin at higher temperatures. So the most important rule is:

- Solder short (3 sec) at not too high a temperature -

But because frequently use is made of solder wick, a somewhat higher temperature is allowed (about 350^{o}C). The Weller soldering bit PT-H7 is a good choice.

In order to work as safe as possible, make sure that during dismounting the heat of the soldering iron is applied via the SMD itself, while during mounting the heat is mainly applied via the print track. So the second rule is:

- Never re-use a dismounted SMD -

Dismounting

A. Remove the solder tin at both sides of the SMD using solder wick.
B. Remove the SMD with a rotating movement using a pair of tweezers while the SMD is heated by the soldering iron. Make sure that no force is applied perpendicular to the print surface in order not to loosen the print tracks.
C. Inspect the spot with a magnifying glass for solder bridging and damage. Large glue rests have to be removed to make flat mounting of the SMD possible. Use solder wick to remove the solder tin left.

Mounting

A. Pre-tin one solder track with fresh resin-cored soldering tin of 0.5 - 0.8 mm diameter.
B. Use a pair of tweezers to place and adjust the SMD in position.
C. Press the SMD onto the print while heating the pre-tinned solder track.
D. Solder both sides of the SMD one by one. Keep the soldering actions shorter than 3 seconds per side and use resin-cored soldering tin of 0.5 - 0.8 mm diameter. If necessary apply a small amount of non aggressive solder flux beforehand.

Note:

Take appropriate measures if components on the print are sensitive to electrostatic discharge (ESD).

PHILIPS

Service Information

Advanced Automation Systems
Audio-communications
Broadcast Equipment
Electronic Security & Recording Systems
Industrial Automation
Scientific & Analytical Equipment
Test and Measurement

Industrial & Electro-acoustic Systems Division

cat. FIELD CHANGE ORDER	nr. FC067	FC067ES104	date 9.7.87
art. gr. ELECTRONIC SECURITY	nr. ES104		rev. sheet 1 of 2

CCD B/W CAMERA

LDH 600/00 & 600/50

FCO 5

INCORPORATED FROM SERIAL NUMBER : 2368

Category : Retrofit on failure

Problem description : Picture disappears after mains interruption, and can only be restored by disconnecting the power supply.

Problem cause : Short mains interruptions result in high current pulses in the switched mode voltage regulator IC 2 on the interface board. The current will, depending on the length of the interruption and type of power supply used, sometimes be sufficiently high to initiate current limiting by IC2. This results in the 22V effectively being switched off until the power to the camera is removed, and then after a number of seconds restored.

Pre-requisite : none

Parts required : a) Interface board code number: 5322 212 40079 (see remarks)

b) resistor 4E7 : 5322 111 90376
smd resistor 1K8 : 4822 111 90383
10 nF Capacitor : 4822 122 31414

Special tools : none

Installation time : a) 0·1
b) 0.8

Modification procedure : a) Camera with s/n > 1000

- Replace interface board

b) Camera with s/n < 1000

On the interface board.
- Remove D3, R12, and C22
- Lift pins 11 14 and 4 of IC 2
- Connect above pins together and to a resistor and capacitor in parrallel of 4E7 ohms and 10nF respectively.
- Connect the otherside of the resistor-capacitor combination to 0V
- Change R7 to a resistor of 1K8

Adjustments : none

Documents affected : Field service manual 4822 733 24279
Update with pages supplied

Solves problem report : N.A.

Remarks : Interface board 12NC & Video Board 12NC in manuals dated prior to 87-07-09 were switched.
Correct numbers are :

5322 212 40081	Video processor
5322 212 40079	Interface board

K.T. Merrington

MANUAL UPDATES

This page contains the update list of this service manual.

Please ensure that your manual always contains **ALL** updates.

UPDATE NUMBER	ISSUE DATE	PAGES CONCERNED	COMMENTS
0	87-04-31	Ch 1-3	Provisional
1	87-06-12	all	first issue
2	87-07-09	Ch 7 and Ch 8 page 13	Updated with SI FC067ES104

CONTENTS

7. SPARE PARTS

Service code	Description	Item
5322 212 40078	Sensor board LDH0600/00	
5322 212 40077	Sensor board LDH0600/50	
5322 212 40081	Video processor	
5322 212 40079	Interface board	
5322 265 40655	Binder Connector male plug	
5322 267 50738	Binder Connector female plug	
5322 267 10004	Plug coax female	
5322 323 50094	PCB interconnection cable	

PHILIPS

Service Information

Advanced Automation Systems
Audio-communications
Broadcast Equipment
Electronic Security & Recording Systems
Industrial Automation
Scientific & Analytical Equipment
Test and Measurement

Industrial & Electro-acoustic Systems Division

cat. MANUALS	nr. MA054	MA05ES105	date 29.7.87
art. gr. ELECTRONIC SECURITY	nr. ES105		rev. sheet 1 of 1

CCD B/W CAMERA

LDH 0600/00 & LDH 0600/05

Document Affected : Service Manual LHD 0600, code number 4822 733 24279

Changes : Chapter 5 has been updated with regards to field adjustments of the video and sensor boards. The other changes are minor relating to an updated list of contents plus some improved pcb layouts for chapter 8.

Replace the following pages as supplied with this SI.

i-1 upto and including i-4
5-1 " " " 5-9
8-5, 8-6, 8-9 and 8-10

K. T. Merrington

MANUAL UPDATES

This page contains the update list of this service manual.

Please ensure that your manual always contains **ALL** updates.

UPDATE NUMBER	ISSUE DATE	PAGES CONCERNED	COMMENTS
0	87-04-31	Ch 1-3	Provisional
1	87-06-12	all	first issue
2	87-07-09	Ch 7 and Ch 8 page 13	Updated with SI FC067ES104
3	87-08-01	Ch i, Ch 5 and Ch 8 pages 5,6,9 and 10	Updated with SI MA054ES105

CONTENTS

CONTENTS

CONTENTS

5. SERVICE ADJUSTMENTS

5.1 Test Equipment

- Oscilloscope min. 25 MHz with delay time base.
- Power supply 12 V/200 mA.
- Monitor.
- RMA resolution test chart or slide.
- 2856 K light source incandescent lamp for lighting chart or slide projector (e.g. Ernitec).
- Luminance meter when using the test chart or a target lux meter (e.g. Ernitec) when using the slide projector.
- A small (e.g. 10% of image height) highlight consisting of a lamp with a reflector and a luminance of approximately 32 times (5 lens stops) the luminance of the test chart. This highlight shall be in or near the plane of the test chart in order to achieve a sharp image of the test chart and the highlight at the same time.

5.2 Opening the camera

- Unscrew the two M3 screws rear side of the camera interface board.
- Hinge the interface board and the video board upwards.
- The electronic circuitry is split up over three printed circuit boards.
- The board which is fixed directly to the camera's housing is the Sensor Board.
- The middle board is the Video Board.
- The rear board with the connectors is the Interface Board.

5.3 Camera with a manual controlled lens

5.3.1 Adjustment of the video level nominal gain setting.

- Aim the camera with the manual controlled lens at a test chart.
- Adjust the iris of the lens to obtain a 250 mVpp negative video signal at MP 1 on the video board.
- Adjust the nominal gain potentiometer R62, marked VID, on the video board, to obtain a video output signal of 700 mVpp at the VBS output loaded with a 75 Ohm termination resistor. (1 V video with composite sync.)

5.4 Camera with an Auto-iris lens

5.4.1 Adjustment of the video level nominal gain setting

- Aim the camera fitted initially with a manually controlled lens at a test chart.
- Adjust the iris of the manually controlled lens to obtain a 250 mVpp negative video signal at MP1 on the video board.
- Adjust the nominal gain potentiometer R62, marked VID, on the video board, to obtain a video output signal of 650 mVpp at the VBS output loaded with a 75 Ohm termination resistor. (1 V video with composite sync.)
- Replace the manual controlled lens with an auto-iris lens.
- Adjust the video output potentiometer on the auto-iris lens to obtain a 700 mVpp video signal at the VBS output.

5.4.2 Black level adjustment

- Adjust the black level potentiometer R65 on the video board, marked BL so that the darkest parts of the scene are between 10 and 20 mV above the blanking level.

5.5 REPAIRS AND SERVICE ADJUSTMENTS AFTER REPAIR.

5.5.1 How to recover a picture

- On the sensor board are six potentiometers which are preset in the factory during manufacture.

CAUTION

Do not turn these potentiometers unnecessarily if the camera is operating satisfactorily.

Only in the case of a lost or distorted picture might it be necessary to readjust these settings.

5.5.2 Fault finding in the case of a lost picture.

1. check the power supply voltage
   - MP1 interface board + 10 V
   - MP2 interface board + 22 V

NOTE:
Some cameras are adjusted to + 20 V at MP2.
Do not chance this voltage.
In case of changing the interface board by a new interface board which is set to 22 V at MP1, all the sensor adjustments have to be readjusted.

2. check if there are sync. pulses on the video output.

3. check if there is video signal on connector X5-1 on the video board.

4. check if there is a video signal on MP1 on the video board.

5. check if there is a video signal on connector XD-11 on the sensor board.

6. check that the d.c. level and the superimposed video on the base of TS8, TS9 and TS10 are equal.

7. check that the d.c. and video levels at OT, OM and OB are equal.

CAUTION

DO NOT SHORT CIRCUIT OT, OM AND OB BECAUSE THIS WILL DEFINITELY DESTROY THE SENSOR.

8. If the above mentioned are available and/or equal, and there is still no picture, check the sensor driver pulses.

5.5.3 General check of sensor driver pulses

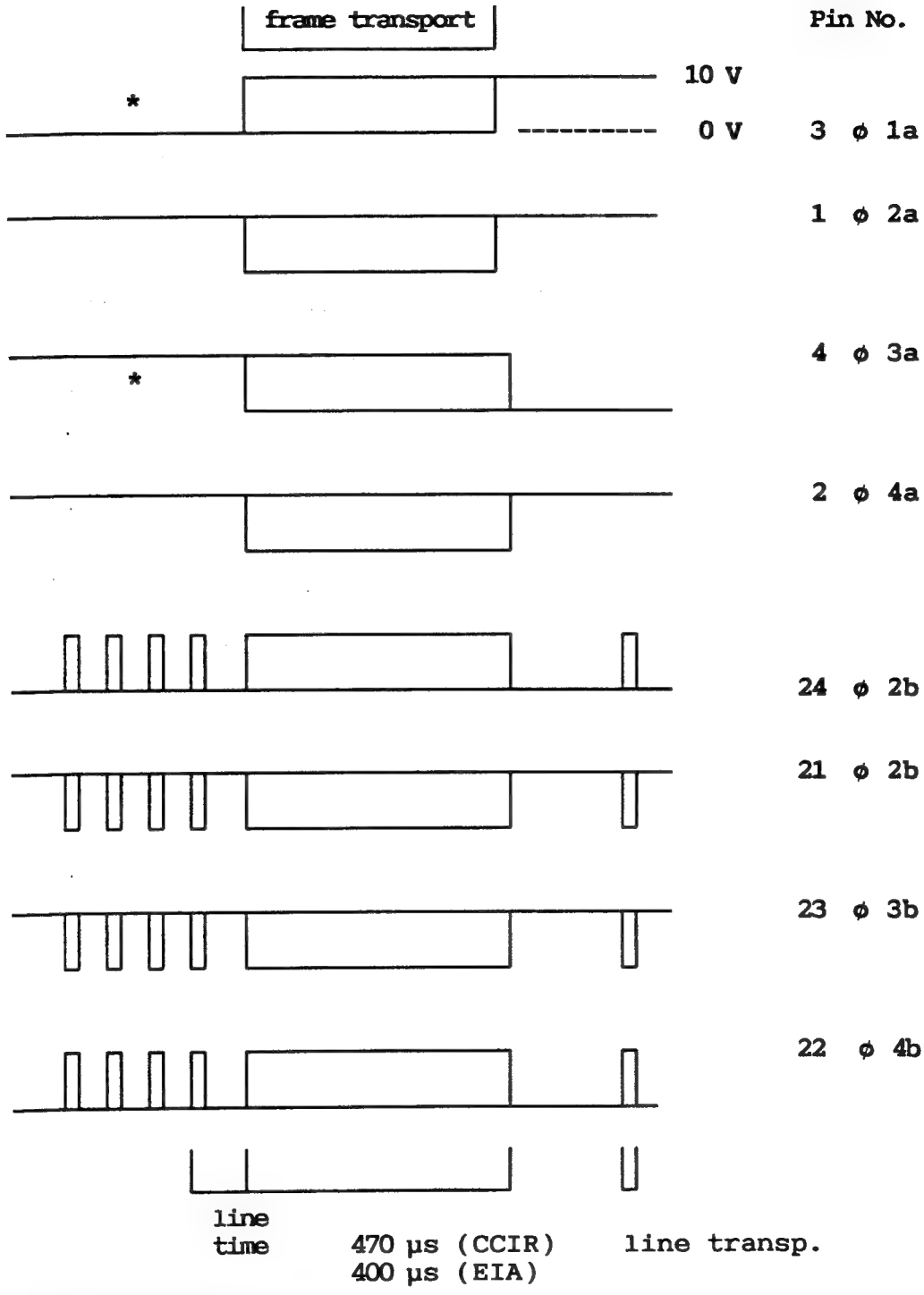
Check the following on connector XD

XD-13	: grnd	
XD-14	: + 10 V +/- 10 mV.	
XD-15	: + 22 V +/- 20 mV.	
XD-8	: V pulse present	
XD-6	: CB pulse, low level	= 0 V +/- 0·3 V
XD-5	: CS pulse, high level	= 8 V +/- 0·3 V
XD-10	: BLC positive pulse	
	frame period	= 20 ms for CCIR
	frame period	= 16·7 ms for EIA
	: BLC vertical pulse	= 50 micro seconds
	Low	= 0
	High	= 10 V +/- 0·3 V

Check presence of pulse patterns on sensor inputs of IC4

All pulses have an amplitude of 10 V +/- 0·25 V.

Trigger the oscilloscope with the V pulse and use a delayed time base.

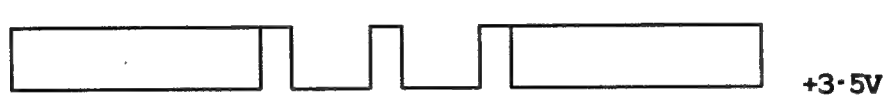


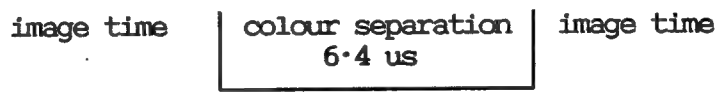
* Alternating per field
This situation for odd —— even field

Pin no.

Check that the d.c. shift possibility with R11 is more than 15 V.
Set low level of pulse at + 5 V.

Check that the d.c. shift possibility with R9 is more than 15 .
Set low level of pulse at + 10 V.





Check that the d.c. shift possibility for ϕ C with R17 is more than 15 V.
Set low level of pulses at + 3·5 V.

The following checks should also be made;

- Check that the d.c. shift possibility is 15 V with R5 on pin 20 (PS).
- Set the d.c. level of PS to 0V.
- Check that the d.c. shift possibility is 15 V with R6 on pin 6 (OG).
- Set the d.c. level of OG to + 8 V.

- Check that the d.c. shift possibility is 19 V with R7 on pin 7 (RD).

- Set the d.c. level of RD to 19 V.

- Check that the d.c. level is 0 V on the following pins;

  pin 9 (SFS)
  pin 18 (IG)
  pin 5 (LS)

- Check that the d.c. level is 22 V on the following pins;

  pin 19 (IN)
  pin 8 (NS)

The previous d.c. settings for Psub, OG, RD, TG1, TG2 and ϕC are course adjustments.

For fine adjustments the following steps should be taken.

5.5.4 Setting up procedure for the sensor controls.

Note: This procedure only holds good provided the sensor voltages have been preset according to the test instructions for the latest version of the sensor board.

Check that the pulse amplitudes on pins 1 to 4 inclusive and 21 to 24 inclusive are at least 9 Vpp during vertical transport (trigger with V-pulse).

Apply as much light to the sensor - using the RMA chart or slide- as is needed to obtain a 250 mVpp negative video signal on MP 1 on the video processor board, i.e. the nominal level.
This level holds good for the test chart image only and not for the highlight.

a. Adjust R5 (Psub) just as much as is necessary to remove any bloom effects.

   NOTE: A. Do not confuse bloom effect with vertical smear, which is inherent to a frame transfer sensor.
   Vertical smear is visible as a set-up of the black level under and above the highlight with a constant level over the whole picture height.
   Bloom effect, however, is caused by a charge overflow with a highlight and is visible as an irregular extension of the image of the highlight especially in the vertical direction. ("Ice-cream" effect).

   B. If Psub is set too high, then saturation effects appear even at the nominal level.
   So do not set Psub higher than is necessary to remove the bloom effect.

b. If vertical knurls ("teeth") under white surfaces of the test image are visible, then adjust R11 (TG 1) clockwise a little (decremental). If horizontal smear after white surfaces is visible, then adjust R17 clockwise a little.

NOTE: With some sensors, this smear effect starts with a reflection like character.

c. Close the iris until the picture content is only noise; a video output of approximately 100 mVpp, apart from the highlight.
If vertical stripes are visible, then adjust R7 (RD) and/or R17 (ϕC) a little, but be aware of possible horizontal smear effects. Some sensors need a small adjustment of R7 and R17 to decrease the level of spurious signals.

NOTE: If TG 2 is too high then horizontal smear appears with highlight levels.

d. Open the iris again for nominal level and check the performance of the image. If any of the effects, described above, appear, then repeat the adjustment procedures described in a, b and c above.

e. Adjust for the out-of-balance between the sensor outputs, which is visible as a vertical stripe pattern in white and grey (3.75 MHz), with R48 and R49. The out-of-balance shall be less than 2% of peak white level.

NOTE: A. Do not confuse the out-of-balance in white with an out-of-balance in black, which can appear if the Black Tracking Control does not operated because of some defect.
B. An out-of-balance of less than 2% in the video output means that the 3·75 MHz stripe pattern is just invisible on the monitor. The amplitude of this out-of-balance at 3·75 MHz at peak white is expressed as less than 14 mVpp with a video signal level of 700 mVpp (at minimum gain).
C. Each re-adjustment or contact by hand of the sensor driving circuit and the Video Pre-Processor, causes an alteration of the black tracking. As the Black Tracking Control operates very slowly, the adjustments have to be carried out in small increments.
D. Always use an insulated screwdriver because TG 1 and TG 2 are especially very sensitive to leakage currents which would cause a mis-adjustment.

5.6 Adjustment of the video level minimum gain setting

5.6.1 Initial State

- Make the solder bridge for Character Identification configuration.

- Connect MP7 to MP9 for fixed minimum gain.

5.6.2 Adjustment procedure

- Fit a manually controlled iris lens onto the camera.

- Aim the camera at a test chart.

- Adjust the iris to obtain 250 mVpp negative video signal at MP1 on the Video Board.

  a. Display the terminated video output on connector X5-1 (VBS)
  The sync. amplitude is 300 mVpp +/- 30 mVpp.
  The video signal is clipped at 800 mV +/- 40 mVpp, because the minimum gain, at this stage, has not been adjusted.

  b. Determine the value of the S.O.T. resistor R6 to obtain 700 mVpp +/- 70 mVpp at the terminated output.

  Note: Decrease R6 from a starting value of 200 kOhm.
  Mount a resistor for R6 which is within 5% of the determined value.

  c. Check that R65 controls the black level by +/- 100 mV.
  Adjust R65 for 10 mV set-up in the video signal.

  d. Disconnect MP7 from MP9.
  Close the iris 1 stop.

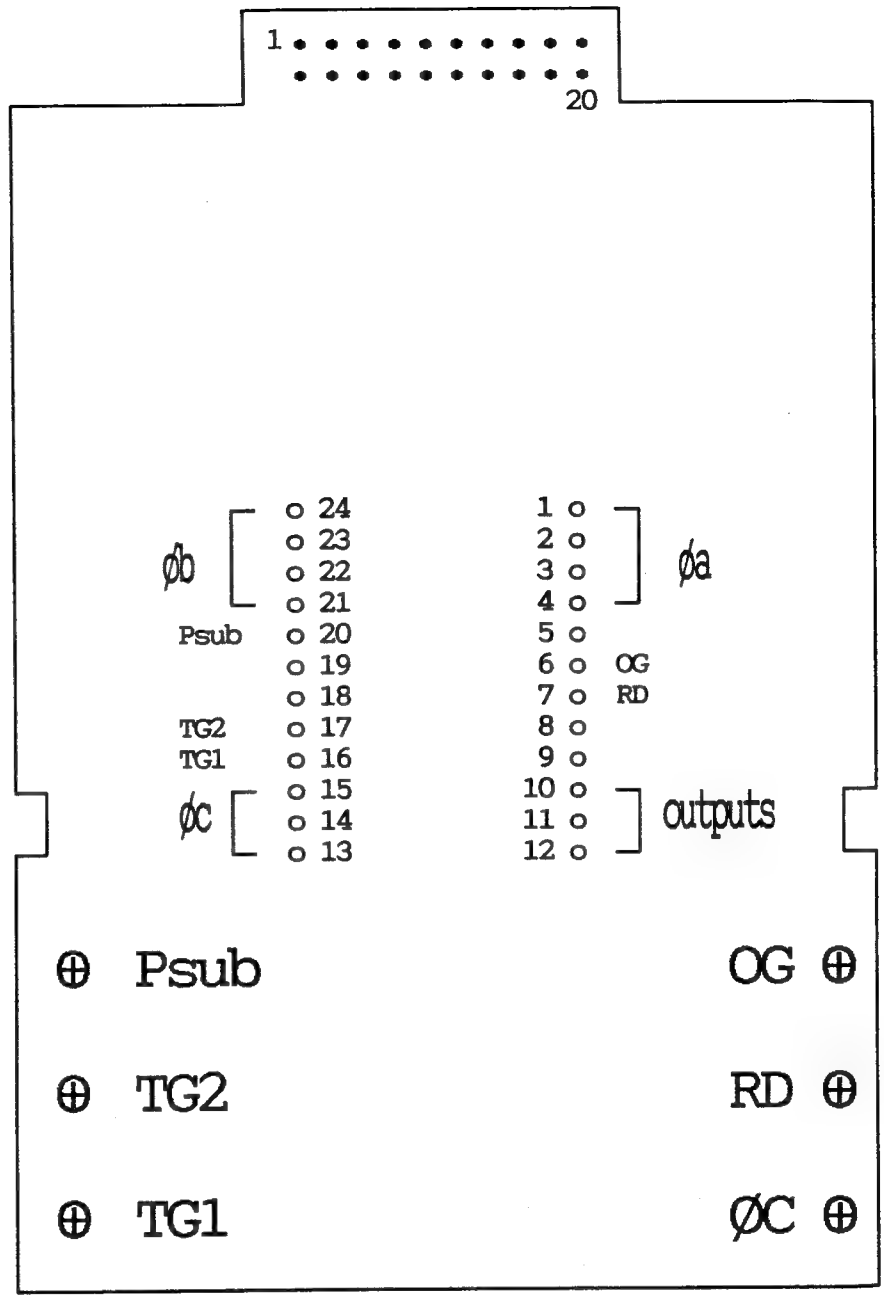
  e. Check that the nominal gain control, R62, now controls the video level from 600 mVpp up to 800 mVpp.
  Adjust R62 to obtain 700 mVpp at the video output.

  f. Check that the output signal on connector X5-2 is the inverse (negative video signal) of the output on X5-1.

  g. Check the AGC hold the video level at the VBS output at 700 mVpp, between the range of 40 mVpp and 250 mVpp at MP1 of the video board.

  Note: The end of the control range is the point at which the control voltage at MP7 suddenly increases to its maximum value (approximately 9 V).

5.7 D.C. Settings Sensor Board



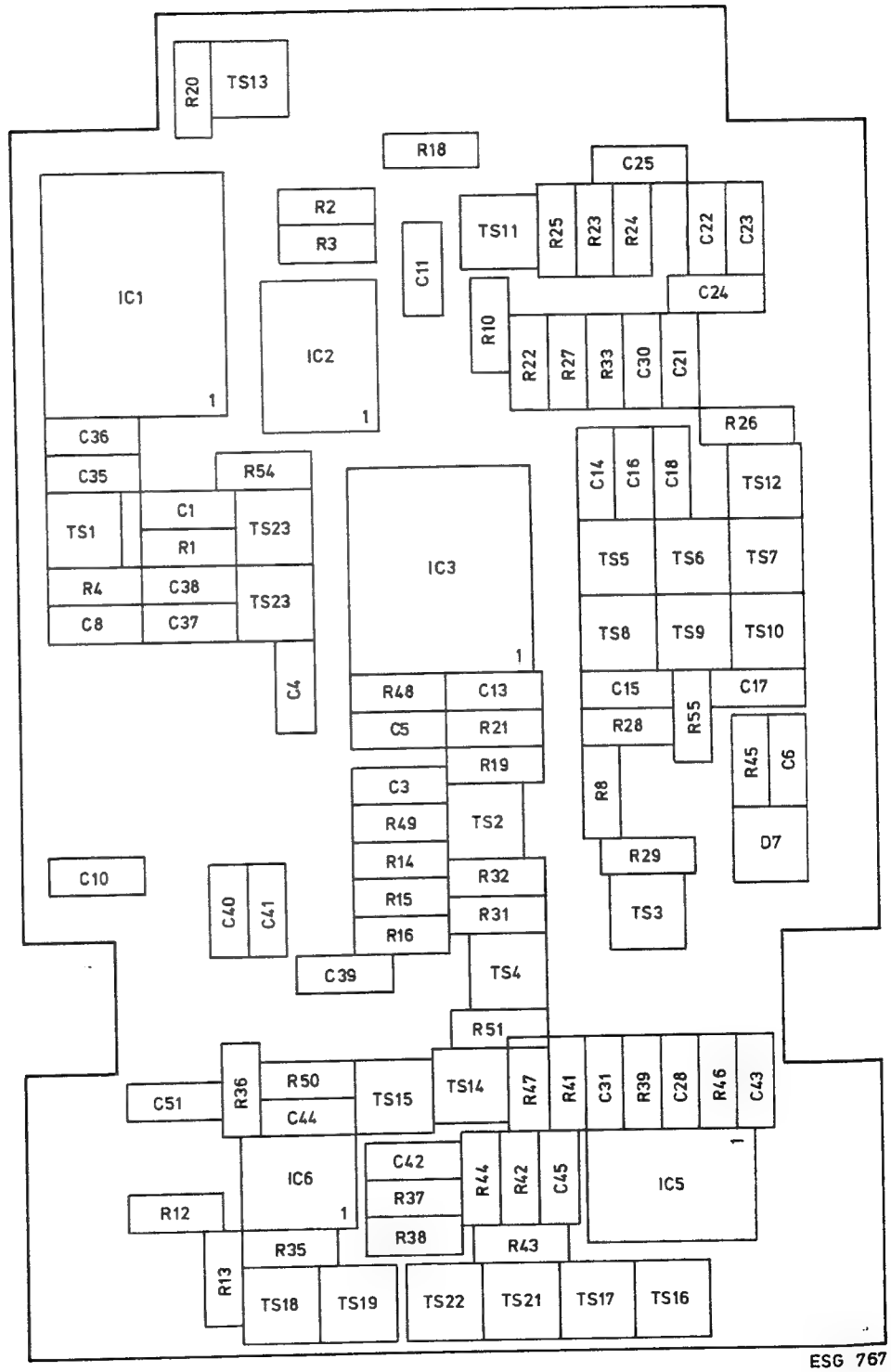
Rear View Sensor Board

Pin 20	Psub	= 2·5V	
6	OG	= 4 V	
7	RD	= 17 V	
13,14,15	øC	= 2 V }	
16	TG1	= 1·2V }	Pulse foot
17	TG2	= 10 V }	

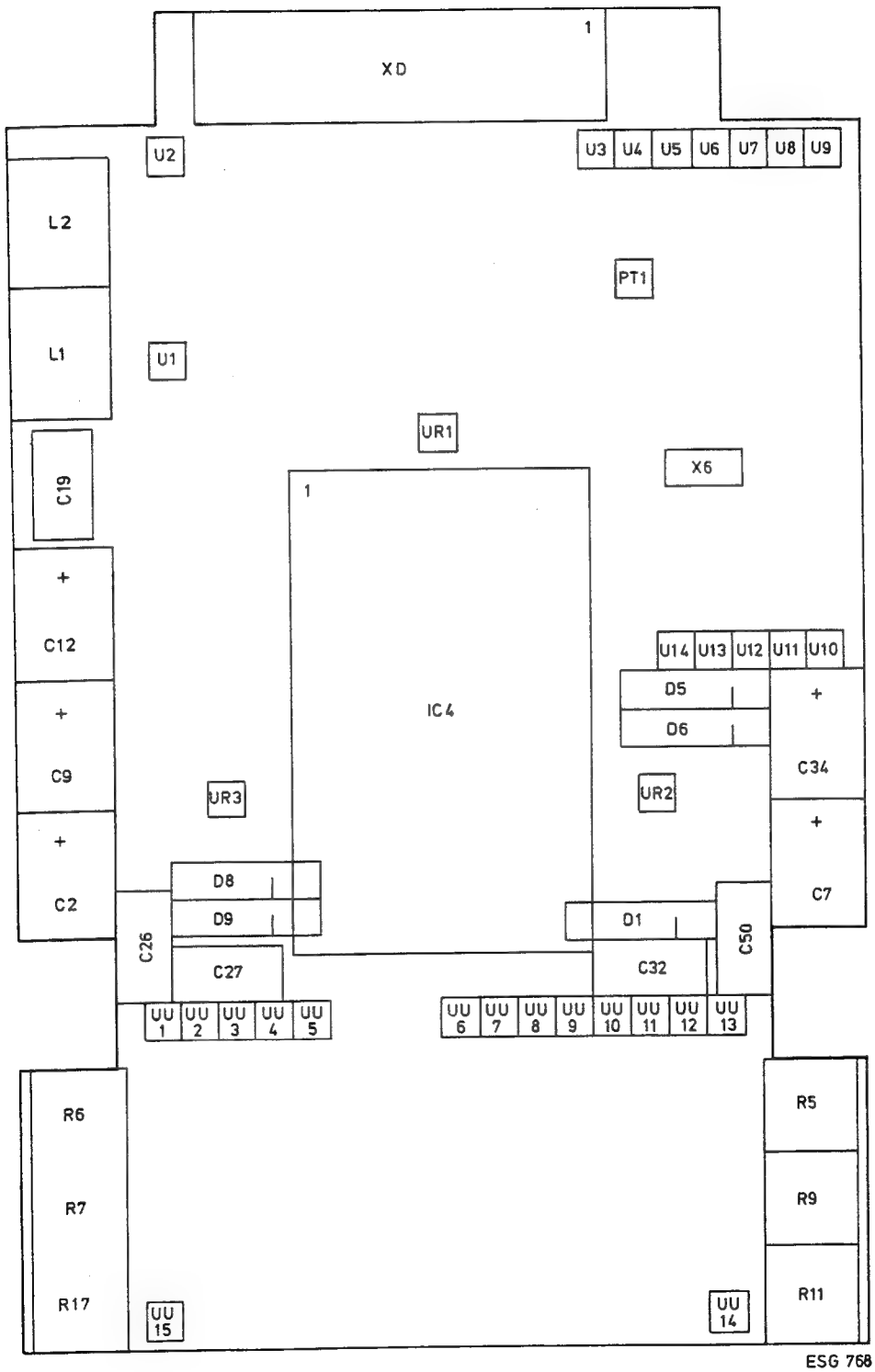
Note: Voltages are approximate values

8.7 Sensor Board Layout

8.7.1 Sensor Board Layout (SMD side)

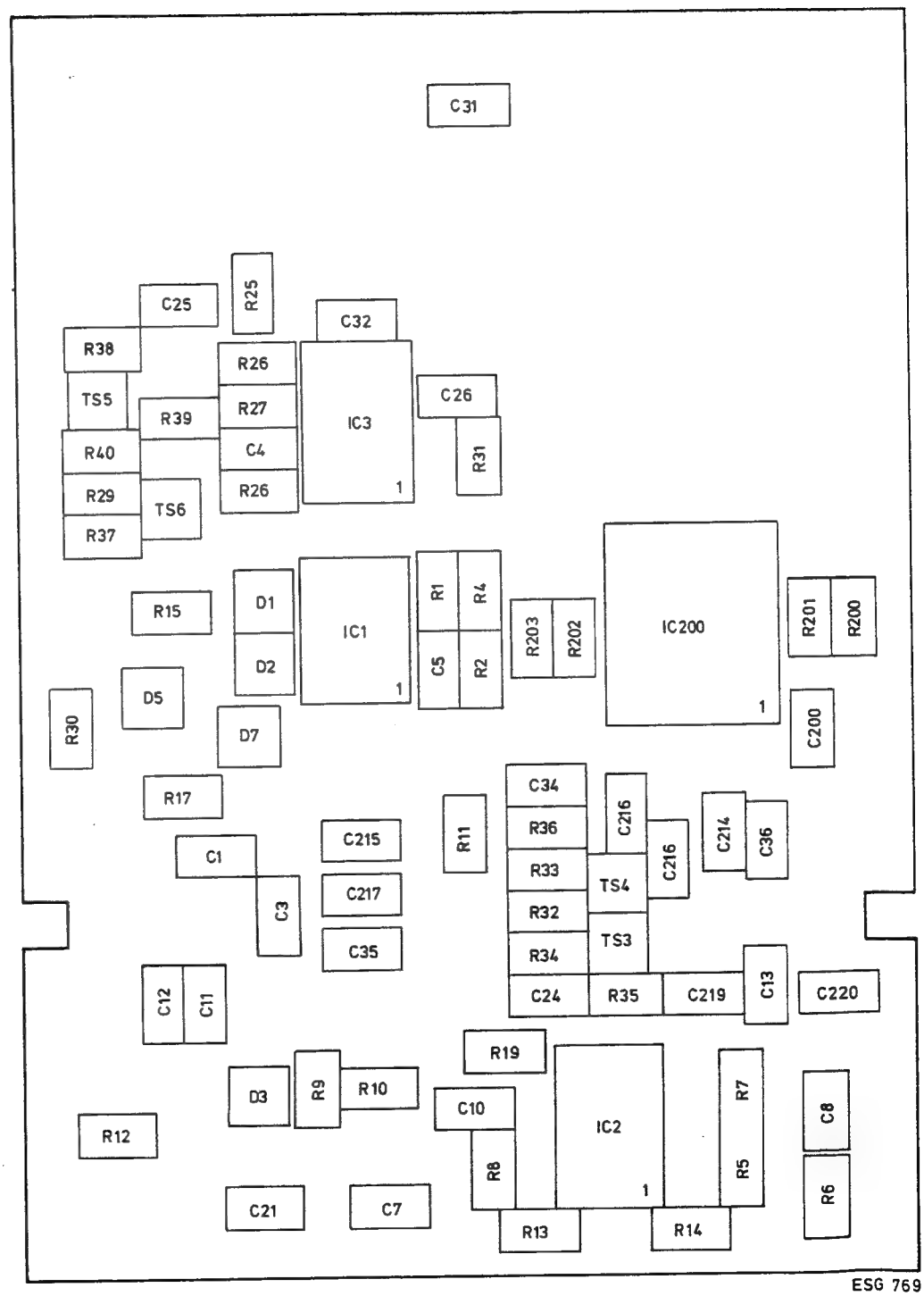


8.7.2 Sensor Board Layout (component side)

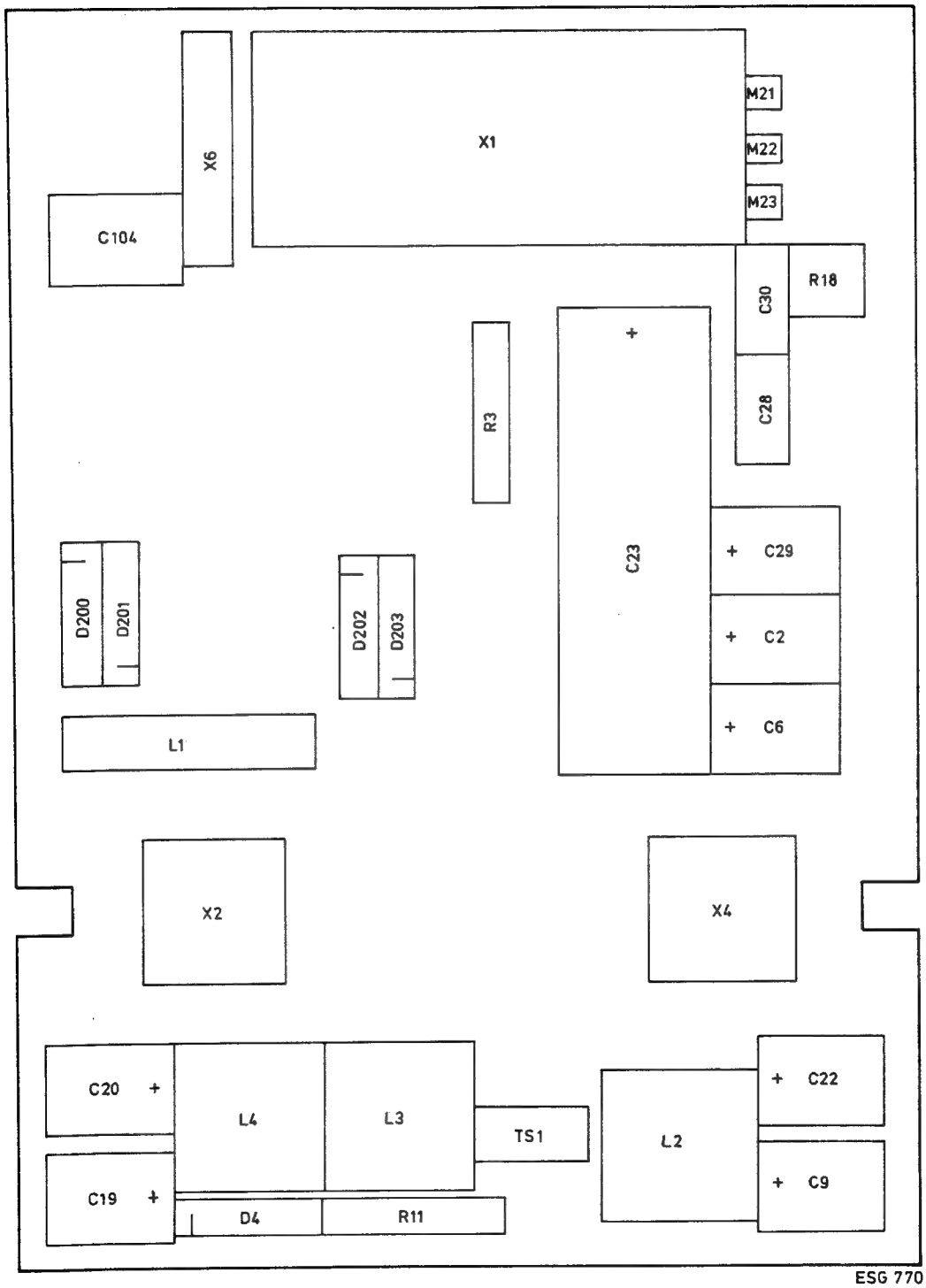


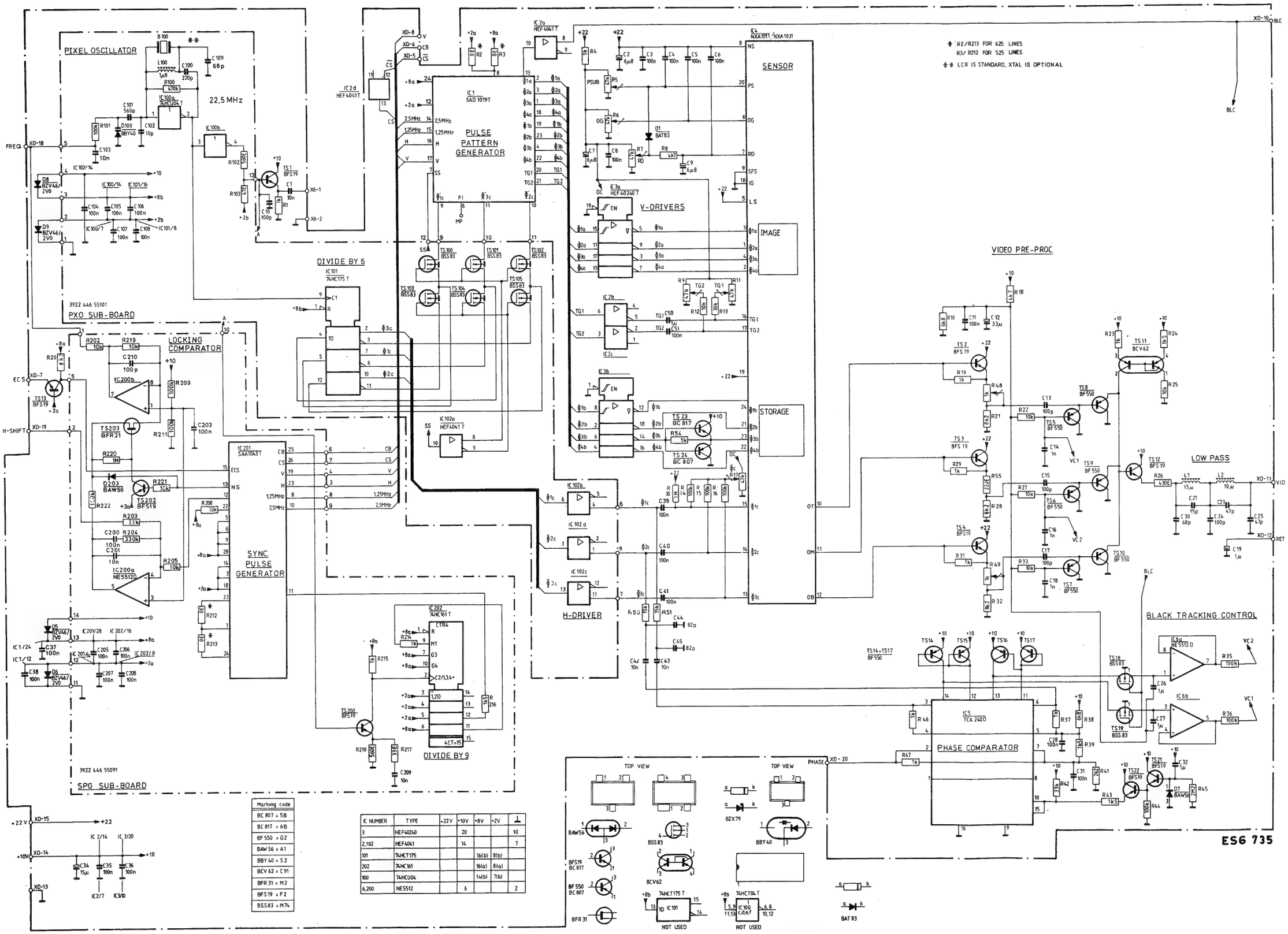
8.9 Interface Board Layout

8.9.1 Interface Board Layout (SMD Side)



8.9.2 Interface Board Layout (component side)



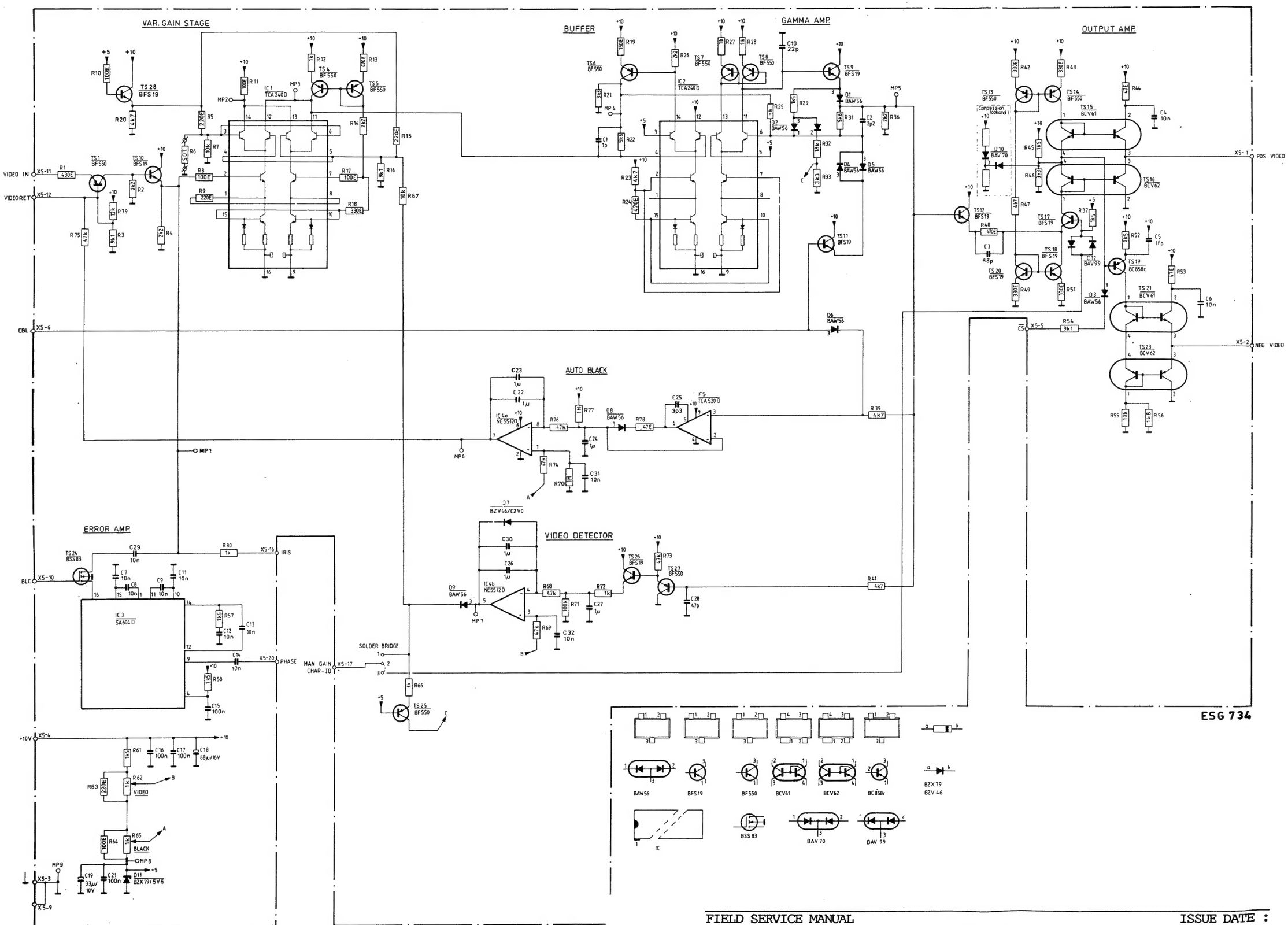


Marking code
BC 807 = 5B
BC 817 = 6B
BF 550 = G2
BAW 56 = A1
BBY 40 = S 2
BCV 62 = C 91
BFR 31 = M2
BFS 19 = F 2
BSS 83 = M74

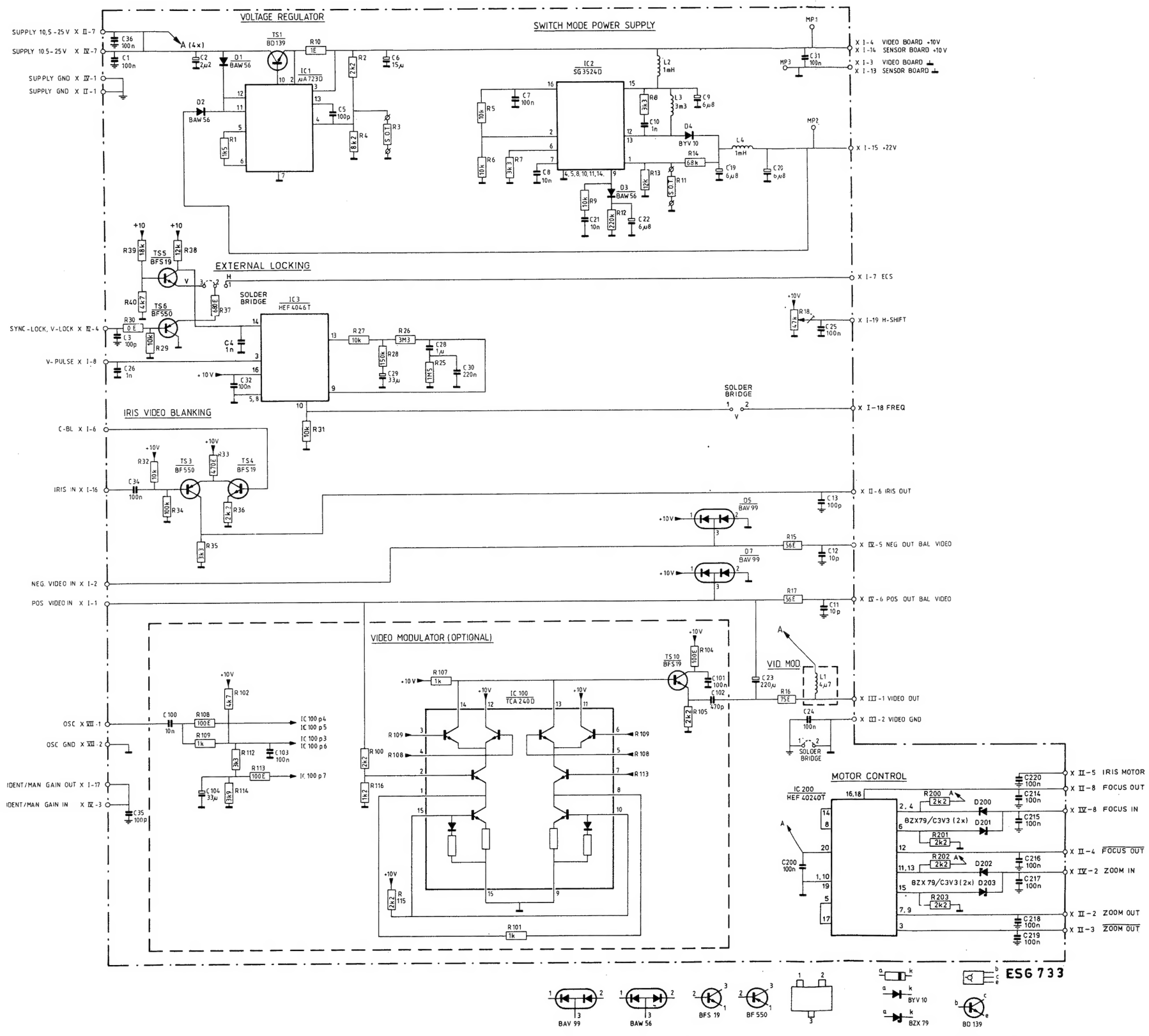
IC NUMBER	TYPE	+22V	+10V	+8V	+2V	⊥
3	HEF 40240		20			10
2,102	HEF 4041		14			7
101	74HCT 175			16(b)	8(b)	
202	74HC 161			16(a)	8(a)	
100	74HCU 04			14(b)	7(b)	
6,200	NE 5512		6			2

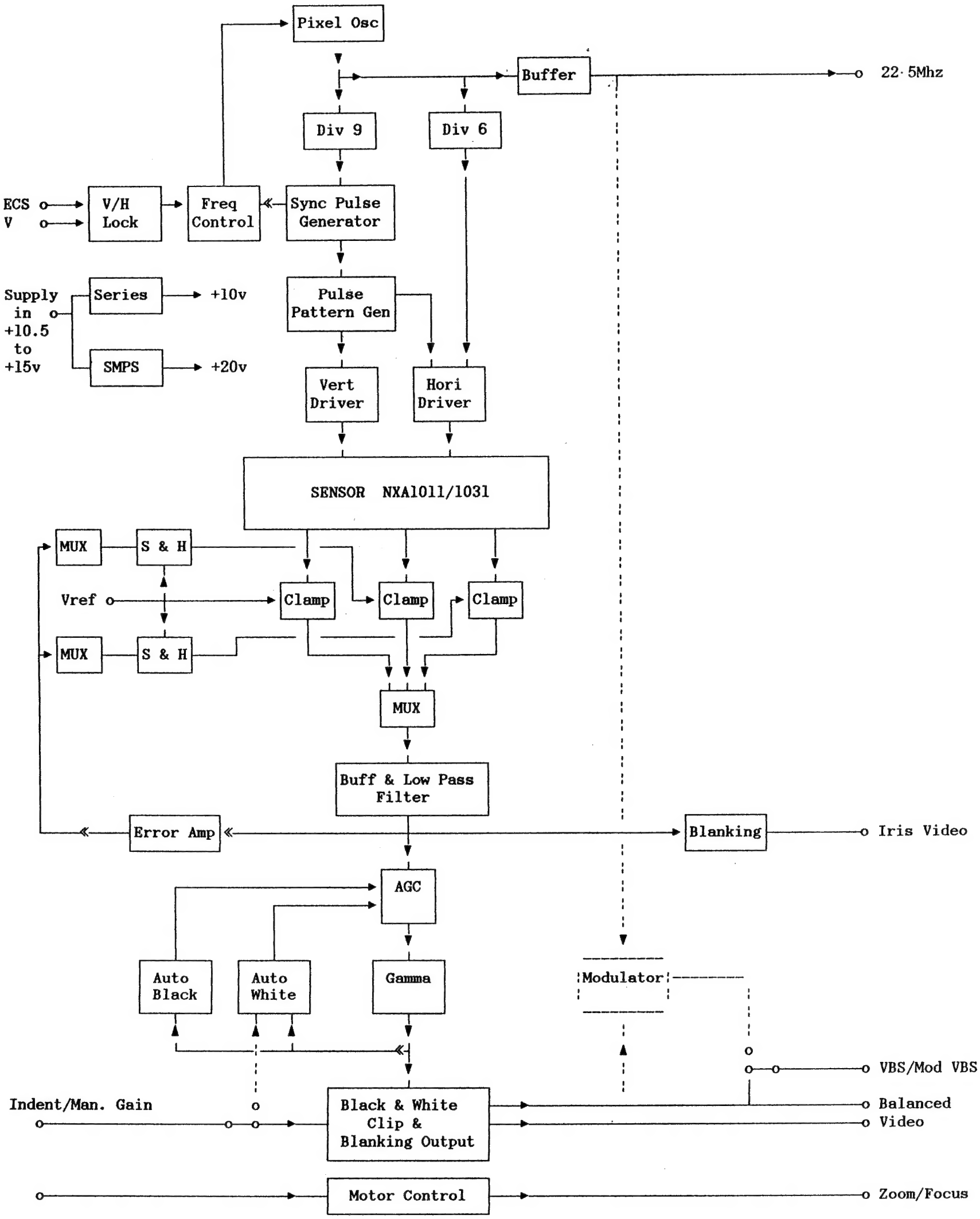
8.10 Electrical Diagrams

8.10.1 Electrical Diagrams Sensor Board

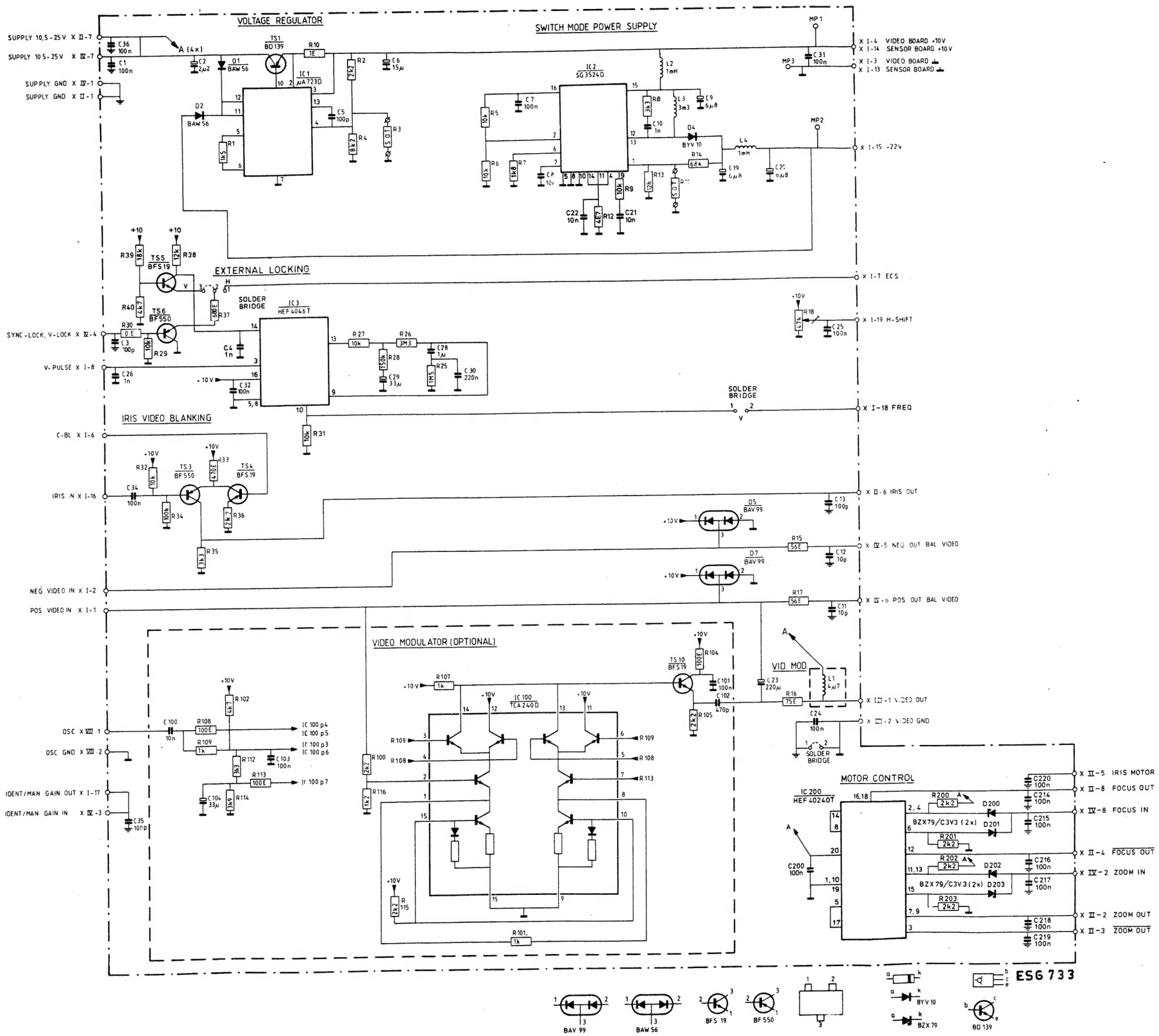


8.10.2 Electrical Diagrams Video Board


VOLTAGE REGULATOR
SWITCH MODE POWER SUPPLY
EXTERNAL LOCKING
IRIS VIDEO BLANKING
VIDEO MODULATOR (OPTIONAL)
MOTOR CONTROL
SOLDER BRIDGE
SUPPLY 10,5 - 25 V X II-7
SUPPLY 10,5 - 25 V X IV-7
SUPPLY GND X IV-1
SUPPLY GND X II-1
SYNC-LOCK, V-LOCK X IV-4
V-PULSE X I-8
C-BL X I-6
IRIS IN X I-16
NEG. VIDEO IN X I-2
POS VIDEO IN X I-1
OSC X VII-1
OSC GND X VII-2
IDENT/MAN GAIN OUT X I-17
IDENT/MAN GAIN IN X IV-3
X I-4 VIDEO BOARD +10V
X I-14 SENSOR BOARD +10V
X I-3 VIDEO BOARD
X I-13 SENSOR BOARD
X I-15 +22V
X I-7 EC5
X I-19 H-SHIFT
X I-18 FREQ
X II-6 IRIS OUT
X IV-5 NEG OUT BAL VIDEO
X IV-6 POS OUT BAL VIDEO
X III-1 VIDEO OUT
X III-2 VIDEO GND
X II-5 IRIS MOTOR
X II-8 FOCUS OUT
X IV-8 FOCUS IN
X II-4 FOCUS OUT
X IV-2 ZOOM IN
X II-2 ZOOM OUT
X II-3 ZOOM OUT
IC1 µA723D
IC2 SG3524D
IC3 HEF4046T
IC 100 TCA240D
IC 200 HEF40240T
BAV 99
BAW 56
BFS 19
BF 550
BYV 10
BZX 79
BD 139
ESG 733



Electronic Block Diagram CCD



8.10.3 **Electrical Diagrams Interface Board (FCO 5)**